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ABSTRACT

This document consists of the five consecutive issues of the journal "Imagine..." published during volume year 2. Typical journal articles cover teaching academically talented secondary students in the following focus areas: (1) mathematical problem solving; (2) the humanities; (3) academic summer programs; (4) science and technology; and (5) foreign languages and study abroad. Sample articles are: "The Joys of Mathematical Problem Solving & Competitions" (Harold B. Reiter); "Math Clubs: An Alternative to Contests" (Ashley Reiter); "Mathcounts: A Coach's Perspective" (Susan Collins); "In the Balance: Acceleration: Evaluating the Controversy over Higher-Speed Education" (Lesley Mackay); "On Public Speaking" (Steven Shepard); "In the Balance: Reconciling Feminist and Multicultural Awareness with Academic Programming in Schools" (Lesley Mackay); "More about the International Baccalaureate" (Wayne Parker); "Why Spend Part of Your Summer Back in the Classroom?" (Amanda Claybaugh); "National Journalism Scholars Academy" (Jennifer White); "Penn Summer Academy in Communication Studies" (Susannah Batko Yovino); "Looking for a Challenge? Try a College Course" (Katy Mischow); "Science Olympiad" (Danny Yavuzkurt); "Research Science Institute: Combining Academic Stimulation with Intense Socialization" (Lauren Williams); "Putting Your Summer Job To Work" (Edwin Foo); "Computer Science: Combining Verbal and Mathematical Skills" (Brian Milch); "In the Balance: Standardized Achievement Testing: Why We Need It, and What It Can and Cannot Do" (Lesley Mackay); "Why Become Proficient in a Foreign Language?" (William G. Durden); "Making Your Overseas Experience Worthwhile" (Leslie Mackay); "A Design of Love" (Priya Venkatesan); and "Recentering the SAT" (Lesley Mackay). (DB)

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IMAGINE

OPPORTUNITIES & RESOURCES FOR ACADEMICALLY TALENTED YOUTH

VOLUME 2

NUMBERS 1-5

SEP/OCT 1994 – MAY/JUNE 1995

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VOLUME 2 • NUMBER 1

Opportunities and Resources for Academically Talented Youth

Spotlight On

MATHEMATICAL PROBLEM SOLVING

September/October 1994

Mark Your Calendar **2**

The Joys of Mathematical Problem Solving & Competitions **3**

Math Clubs: An Alternative to Contests **6**

MATHCOUNTS: A Coach's Perspective **7**

ARML: Pushing the Limits of Mathematical Knowledge among Fellow Math Whizzes **8**

Math by Mail **10**

Acceleration: Evaluating the Controversy over Higher-Speed Education **11**

Fascinating Classics: Emma **14**

More Good Books **15**

The Inside Scoop on Applying to College **16**

Students Review Princeton University **18**

Creative Minds Imagine **20**

The winners of the U.S.A. Mathematical Olympiad line up before a statue of Albert Einstein. Following an intensive month's training at the U.S. Naval Academy, six of these young men comprised the U.S. team that won the IMO in July. *(l to r) Christopher Chang (alternate), Jonathan Weinstein, Jacob Rasmussen (alternate), Noam Shazeer, Aleksandr Khazanov, Stephen Wang, Jeremy Bem, Jacob Lurie.*

Congratulations on a whole trophy case of firsts!

In a spectacular, history-making performance, this year's U.S. team to the International Mathematical Olympiad in Hong Kong significantly outpaced the field to carry off the 1994 world title. Competing against other top-notch math students from sixty-nine countries during the grueling two-day, nine-hour exam, each of the six U.S. team members earned a perfect score and a gold medal—an accomplishment unprecedented in the IMO's thirty-five-year history.

How'd they do that? Successful IMO winners have two things in common: they love math problem solving, and they're willing to work hard to succeed. They have taken full advantage of opportunities they've encountered, both within and outside school, to immerse themselves in this field of knowledge. Parents who support, teachers who engage, mentors and coaches who challenge, and academic summer programs and competitions that motivate—all may contribute to these students' achievements.

In this issue, we take a look at some of the many options available to *Imagine* readers who are looking for ways to explore, extend, and enjoy their own mathematical abilities. ■

Printed on recycled paper.

Mark Your Calendar

Academic competitions come in so many styles and formats throughout the school year, you're sure to find at least one that appeals to your particular interests. Major mathematics competitions are described on the following pages. Below are October-December registration deadlines for some well-known national competitions in the humanities and sciences. (February-May deadlines will be listed in a future issue.)

Deadline	Competition
October	**United States Academic Decathlon** (Schools register teams, grades 9-12; state deadlines vary): 11145 183rd Street, P.O. Box 5169, Cerritos, CA 90701-5169; (310) 809-4995.
October	**Future Problem Solving Program** (Schools register teams, grades 7-12): FPSP, 318 W. Ann Street, Ann Arbor, MI 48104-1337; (313) 998-7377.
Oct. 15	**National Geography Bee** (Principals register, grades 4-8): National Geographic Society, 1145 17th Street, NW, Washington, DC 20036; (202) 828-6659.
Nov. 23	**Knowledge Master Open** (Schools register, grades 5-12): Academic Hallmarks, Box 998, Durango, CO 81302; (800) 321-9218.
Dec. 1	**National German Test** (German teachers register, German II-IV): American Association of Teachers of German, 112 Haddontowne Ct. #104, Cherry Hill, NJ 08034; (609) 795-5553, fax (609) 795-9398.
Dec. 1	**Westinghouse Science Talent Search** (Students enter project, grade 12 only): Science Service, Inc., 1719 N Street, NW, Washington, DC 20036; (202) 785-2255.
Dec. 1	**ACSL Computer Science Contest** (Schools register, grades 12 & below): P.O. Box 02940, Providence, RI 02940; (401) 822-4312.
Dec. 16	**National Academic Team Challenge (English & History)** (Teachers register, grades 9-12): Foundation for Scholastic Achievement P.O. Box 3340, Iowa City, IA 52244; (312) 464-4812.
Dec.-Mar.	**National Federation of Press Women High School Journalism Contest** (Students enter, grades 9-12; state deadlines vary): NFPW Headquarters Office, P.O. Box 99, Blue Springs, MO 64013; (816) 229-1666.
January	**USA Computing Olympiad** (School coordinators register, grades 9-12): Dr. Donald T. Piele, USACO Director, University of Wisconsin-Parkside, Box No. 2000, Kenosha, WI 53141-2000; (414) 634-0868.
Jan. 10	**National Greek Exam** (Schools register, levels one-three): Professor Ed Phinney, Dept. of Classical Studies, Box 33905, University of Massachusetts, Amherst, MA 01003-3905.
Jan. 10	**National Latin Exam** (Latin teachers register, Latin I-V): American Classical League/National Junior Classical League, P.O. Box 95, Mount Vernon, VA 22121.
Jan. 13	**Duracell/NSTA Scholarship Competition** (Students enter, grades 9-12): National Science Teachers Association, 1840 Wilson Boulevard, Arlington, VA 22201; (703) 312-9260.
Jan. 23	**NCTE Achievement Awards in Writing** (Teachers nominate junior-year students): NCTE Achievement Awards in Writing, 1111 W. Kenyon Road, Urbana, IL 61801-1096.
Jan. 23	**National Peace Essay Contest** (Students enter with adult contest coordinator, grades 9-12): United States Institute of Peace, 1550 M Street, NW, Suite 700, Washington, DC 20005-1708; (202) 429-3846.
Other:	**National Spelling Bee** (Scripps Howard, Inc.): Students enter only through a sponsoring newspaper; check with your local press to see if they participate.

Request for Mailbag Questions:

Students & Parents—

Do you have a question about educational placement, subject/grade acceleration, or other concerns relevant to academically talented students? If so, please write to *Imagine*, SET at CTY, The Johns Hopkins University, Baltimore, MD 21218.

Imagine...
Opportunities and Resources for Academically Talented Youth

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SET Director • Linda E. Brody, Ed.D.
Research Associate • Carol C. Blackburn, Ph.D.
Staff Writer/Editor • Susan B. Hellerman
Staff Writer • Lesley Mackay
Administrative Assistant • Patricia A. Wade
Designer, JHU Press • Lesli M. Lai

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Address editorial correspondence to:
Susan B. Hellerman
SET at CTY
The Johns Hopkins University
Baltimore, Maryland 21218
Phone: (410) 516-0309 • FAX: (410) 516-0108

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The Joys of Mathematical Problem Solving & Competitions

by Dr. Harold B. Reiter
Professor of Mathematics
University of North Carolina at Charlotte

Problem solving has always enjoyed a high status among mathematicians. In fact, it has been said that there are just two types of mathematicians: problem solvers and theory builders. Problem solvers are always on the lookout for great problems. To be "great," a problem must be brief, clear, and require a combination of tools: mathematical concepts, creative strategies, resourcefulness, and ingenuity. It also must not have an obvious solution.

In 1900, the brilliant mathematician David Hilbert discussed the nature of great problems in a famous speech at the International Congress of Mathematicians in Paris:

A mathematical problem should be difficult in order to entice us, yet not be completely inaccessible, lest it mock our efforts. It should be a guidepost on the tortuous paths to hidden truths; ultimately rewarding us by the pleasure in the successful solution.

Hilbert then challenged the Congress with twenty-two truly great problems, the solutions to which have since generated huge new areas of mathematical research.

Are you a problem solver? How do you react to a math problem that looks completely new to you? Do you say, "Hey, I haven't seen this in school, so why should I be able to do it?" Or do you think, "I don't see what to do, but maybe if I try this..."? These contrasting attitudes pretty well distinguish the rest of the population from the problem solvers—for whom the fun is not simply in getting the answer, but in figuring out how to approach the problem. The mathematician who poses the question hopes that the reader will reach deep within to come up with an idea he or she didn't know was there.

There is no doubt that problem solving is a skill that can be learned. For example, students invited to attend the Mathematical Olympiad Summer Program usually make more progress their second year even if they're comparatively young. (To learn how to qualify for this prestigious program, keep reading.) Those who study math at the academic summer programs run by talent searches improve their problem solving skills enormously. And your teachers foster problem solving abilities whenever they give you problems you can't resist. Once you're hooked, your natural curiosity compels you to keep searching for the solution—and for new problems.

Math Competitions

Mathematics contests, which have proliferated during the past twenty years, provide ideal adventures for students who enjoy the pursuit of great problems. Contests exist at all academic levels from elementary school on up, with the greatest variety available at the high school level.

Math contests are run in several different formats, including one-time exams administered by schools, individual correspondence, and team travel. Contests in all three categories are described on these pages, accompanied by sample problems from previous years' competitions. (For a greater challenge, some problems do not include a list of possible answers.)

If you enjoy these problems, talk to your math teacher about class or school participation in particular contests that appeal to you. Write or call for specific information on registration, cost, and awards. Improve your competitive edge by practicing with past exams, available from most of the organizations mentioned here. And to avoid disappointment, be sure to note the registration deadlines.

Remember, if problem solving intrigues you, math competitions provide a wealth of opportunities to engage your curiosity. Enjoy yourself!

MATHCOUNTS
(school; team travel)

The MATHCOUNTS program, for students in *grades 7 and 8*, continues nearly all year. Your teacher signs the school up in the fall and receives materials to help prepare you for the type of problems and format of the competitions. The in-school round in December is used to select a team of four for travel to competitions. If your team does well at the regional level, it advances to the state competition about six weeks later. The four top-scoring individuals qualify to represent your state in the nationals, held in Washington, D.C., in late April or early May.

For more about MATHCOUNTS, see the article on page 7.

Registration deadline: November 11

MATHCOUNTS Registration, P.O. Box 441, Annapolis Junction, MD 20701; (301) 498-6141. All other questions: MATHCOUNTS Foundation, National Society of Professional Engineers, 1420 King Street, Alexandria, VA 22314-2794; (703) 684-2828.

Mathematics Olympiad for Elementary Schools (school, teams)

The MOES is designed to engage students in *grades 4-6* in creative problem solving activities. Your school may register one or more teams of up to 35 students each. Contest packets include five problems for each of five contests to be held at your school during the academic year. This past year, over 3,000 teams (80,000 students) registered from all the U.S. states and its territories and from 23 foreign countries.

1. The sum of the heights of Paul and Rachel is 94 inches. If Rachel is 8 inches taller than Paul, how many inches tall is Paul? (3 minutes)

2. There are exactly six different three-digit numbers that can be formed using each of the digits 4, 5, and 6 exactly once in each number. Find the average of these six three-digit numbers. (5 minutes)

Two publications are available through MOES: *Creative Problem Solving in School Mathematics* and *Mathematical Olympiad Contest Problems for Children*; write for descriptive fliers.

Registration deadline: September 30

Dr. George Lenchner, MOES 125 Merle Avenue, Oceanside, NY 11572; (516) 536-7846, fax (516) 536-3560.

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American Junior High School Mathematics Exam* (school, one-time exam)

The AJHSME may be taken by all students in *grades 8 and below*. Registered schools will administer this exam on November 17; there are 25 multiple-choice problems to be worked in 40 minutes. You may use a calculator. (If you do well, you'll be invited to take the American High School Mathematics Exam.) The AJHSME is sponsored by eight mathematical organizations, including the Mathematical Association of America and the National Council of Teachers of Mathematics.

1. Pat Peano has plenty of 0's, 1's, 3's, 4's, 5's, 6's, 7's, 8's, and 9's, but has only twenty-two 2's. How far can Pat number pages in his scrapbook with these digits?
2. Five runners P, Q, R, S, and T have a race, and P beats Q, P beats R, Q beats S, and T finishes after P and before Q. Who could not have finished third in the race? (a) P and Q; (b) P and R; (c) P and S; (d) P and T; (e) P, S, and T.
3. What is the number directly above 142 in this array of numbers?

```
                1
            2   3   4
        5   6   7   8   9
   10  11  12  ...
```

Registration deadline: October 17

Dr. Walter E. Mientka, Director, American Mathematics Competitions, Department of Mathematics and Statistics, University of Nebraska, 1740 Vine Street, Lincoln, NE 68588-0658; (402) 472-2257.

USA Mathematical Talent Search (mail, individual)

Students in *grades 9-12* register individually for the USAMTS. This contest, begun in 1989, encourages creative problem solving as an intellectual habit rather than a once-a-year activity. Four rounds of five problems each are mailed to you during the school year, and you have several weeks to come up with your own detailed, well-written solutions. The professional mathematicians who read the submissions also comment on your solutions.

1. The set S consists of five integers. If pairs of distinct elements are added, the following ten sums are obtained: 1967, 1972, 1973, 1974, 1975, 1980, 1983, 1984, 1989, 1991. What are the elements of S?
2. Find $x^2 + y^2 + z^2$ if x, y, and z are positive integers such that $7x^2 - 3y^2 + 4z^2 = 8$ and $16x^2 - 7y^2 + 9z^2 = -3$.
3. A bag contains 1993 red balls and 1993 black balls. We remove two balls at a time repeatedly and discard them if they are the same color. We discard the black ball and return the red ball to the bag if they are different colors. What is the probability that this process will terminate with one red ball in the bag?

Registration deadline: May 15

Dr. George Berzsenyi, Department of Mathematics, Box 121, Rose-Hulman Institute of Technology, Terre Haute, IN 47803; (812) 877-8474, fax (812) 877-3198.

**If your school does not participate in the American Mathematics Competitions (AJHSME and AHSME), ask Dr. Mientka about arranging to take the tests through another school in your area.*

International Tournament of Towns (teams)

This contest, with junior and senior divisions for students in *grades 8-12*, has grown during the past ten years or so from a small problem solving competition among a few Russian cities, to a worldwide network of cities tied by electronic mail to the organizers in Moscow. The problems are quite beautiful and very challenging. You may participate only as a member of a team representing your city. (Until now, only New York City and Charlotte, North Carolina, have formed teams in the U.S.)

Each team writes four papers a year, two in the fall and two in the spring. Students are asked to work no more than three problems during the five hours available. Individual scores are based on participants' age, the quality of the solutions, and the difficulty of the problems worked.

(sample junior-level problems)

1. Clyde has a remarkable coin machine. Every time he puts a penny in, it returns 5 nickels, and every time he puts a nickel in, it returns 5 pennies. If Clyde starts with just one penny, is it possible that he will ever have the same number of pennies and nickels? Find necessary and sufficient conditions on what he must start with so that he can eventually attain the same number of each type coin. Justify your answer.
2. We wish to put checkers down on a nine-by-nine board, subject to the requirement that the centers of any two squares containing checkers must be more than two units apart. What is the greatest number of checkers that can be put on the board? Prove that your answer is correct.
3. One hundred numbers 1, 1/2, 1/3, . . . , 1/100 are written on the blackboard. You can delete two numbers, a and b, among them and write one number instead, namely a + b + ab. After 99 such operations, only one number is left. What is the final number?
4. A pedestrian walked for 3.5 hours. In every period of one hour's duration, he walked 5 kilometers. Is it true that his average speed was 5 kilometers per hour?
5. Inside square ABCD, consider a point M. Prove that the points of intersection of the medians of triangles ABM, BCM, CDM, and DAM form a square.

Registration deadline: October 1

Dr. Mark E. Saul, International Tournament of Towns, 711 Amsterdam Avenue, New York, NY 10025-6907; (212) 666-5188; or Dr. Harold B. Reiter, Department of Mathematics, University of North Carolina-Charlotte, Charlotte, NC 28223; (704) 547-4561.

The Mandelbrot Competition (school, teams)

The Mandelbrot—named for Dr. Benoit Mandelbrot, a pioneer in the field of fractal theory—was organized by three students who themselves were avid participants in math contests and who wanted to educate, as well as challenge, students in *grades 9-12*. In the fall, registered schools receive an outline of competition topics: all non-calculus high school subjects, plus additions such as number theory or classical inequalities. Five rounds take place during the school year, each with an individual test of seven short-answer questions, to be completed in 40 minutes, and a team test, during which four students work together on proofs designed to enhance understanding of a particular subject.

Also available through this organization is the two-volume *Art of Problem Solving*, containing lessons designed to promote success on national contests.

1. There are 11 men and 24 women at a dance. Two of the women insist upon having a male partner (anyone will do) for every song. If there is no partner changing during songs, what is the minimum number of songs that must be played so that it is possible for every man to dance with every woman?
2. Given a checker on one of three distinct points, to move is to shift the checker to one of the other two points. Given the starting point of the checker, in how many ways can it make a series of 13 moves so that it ends up at the same point as it began?

Registration deadline: October 15

Greater Testing Concepts, P.O. Box A-D, Stanford, CA 94309.

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American High School Mathematics Exam (school, one-time exam)

Each February, three hundred thousand students nationwide participate in the AHSME, which is administered at your school. This forty-five-year-old contest is sometimes referred to as "the annual high school contest." The AHSME is a thirty-question, multiple-choice, calculators-allowed exam, to be completed in 90 minutes.

1. Three cubes with volume 1, 8, and 27 are glued together at their faces. What is the smallest possible surface area resulting from such a configuration?
2. Pat intended to multiply a number by 6, but instead divided by 6. Pat then meant to add 14, but instead subtracted 14. After these mistakes, the result was 16. If the correct operations had been used, what value would have been produced?
3. What is the size of the largest subset, S, of {1, 2, 3, ..., 50} such that no pair of distinct elements of S has a sum divisible by 7?
4. Let C_1 and C_2 be circles of radius 1 that are in the same plane and tangent to each other. How many circles of radius 3 in this plane are tangent to both C_1 and C_2?

Registration deadline: January 16

Dr. Walter E. Mientka, Director, American Mathematics Competitions, Department of Mathematics and Statistics, University of Nebraska, 1740 Vine Street, Lincoln, NE 68588-0658; (402) 472-2257, fax (402) 472-6087.

American Invitational Mathematics Exam
(invitation only)

The AHSME, AIME, and USAMO comprise the three-tier exam schedule leading to membership on the US team that competes each summer in the International Mathematical Olympiad. If you score at least 100 (out of a possible 150) on the AHSME, you are invited to take the AIME, a fifteen-question, integer-answer exam, to be completed in three hours; calculators are not permitted.

1. The increasing sequence 1, 3, 4, 9, 10, 12, 13, ... consists of all positive integers that are powers of 3 or sums of distinct powers of 3. Find the 100th term of this sequence.
2. What is the largest positive integer n for which $n^3 + 100$ is divisible by $n + 10$?
3. What is the largest possible distance between two points, one on the sphere of radius 19 with center (-2, -10, 5) and the other on the sphere of radius 87 with center (12, 8, -16)?
4. Find the area of the region enclosed by the graph of $|x - 60| + |y| = \left|\frac{x}{4}\right|$.

Dr. Harold Reiter and his daughter Ashley, (see "Math Clubs") at work on basic problem solving skills

American Regions Math League
(team travel)

Better known by its acronym, ARML grew out of the New York State Math League and is now the closest contest we have to a national on-site math championship. Teams of fifteen students represent states and cities at two (soon to be three) sites in early June.

For more about ARML, see the article on pages 8-9.

Registration deadline: 1st week in May

Dr. Mark E. Saul, ARML President, 711 Amsterdam Avenue, New York, NY 10025-6907; (212) 666-5188 or Barbara Rockow, ARML Corresponding Secretary, Bronx High School of Science, 75 West 205th Street, Bronx, NY 10468; (718) 295-0200.

USA Mathematical Olympiad
(invitation only)

Once the AIME has been scored at the American Mathematics Competitions office in Lincoln, Nebraska, a threshold qualifying score (of about 200) is determined for the USAMO. Roughly 150 students—those whose AHSME score plus ten times their AIME score exceeds this threshold—are invited to write the USAMO exam. High scorers on the USAMO are invited to attend the Mathematical Olympiad Summer Program, and the six highest scorers represent the United States at the International Mathematical Olympiad.

1. Prove that
$$\frac{1}{\cos 0^\circ \cos 1^\circ} + \frac{1}{\cos 1^\circ \cos 2^\circ} + \cdots + \frac{1}{\cos 88^\circ \cos 89^\circ} = \frac{\cos 1^\circ}{\sin^2 1^\circ}$$
2. A certain state issues license plates consisting of six digits (from 1 to 9). The state requires that any two plates differ in at least two places. (Thus, the plate numbers 027592 and 020592 cannot both be used.) Determine, with proof, the maximum number of distinct license plates that the state can issue.

In addition to these national contests, math competitions are also offered by many states. Some have mathematics leagues in which meets are hosted by member high schools, much like track or football leagues. To learn about what's available in your area, get in touch with your State Department of Instruction or the National Council of Teachers of Mathematics (NCTM) state affiliate.

For information on more than 175 academic competitions in math and other subjects, see the fifth edition of *Freed's Guide to Student Contests and Publishing*, by Judith M. Freed (Fountainpen Press, 218 West Fountain Avenue, Delaware, OH 43015; $13.95).

Dr. Reiter teaches mathematics at the University of North Carolina-Charlotte and is the Chairman of the AHSME Committee. He has been writing problems for AJHSME, AHSME, and MATHCOUNTS for many years.

Answers

MOES: 1) 43. 2) 555

AJHSME: 1) {19, 2) P and S. 3) 120

T of T: 1) When n - p is a multiple of 6, where n and p are the number of nickels and pennies, respectively. 2) 17. 3) 100. 4) No

USAMTS: 1) 983, 984, 989, 991, 1000. 2) {65. 3) {

AHSME: 1) 72. 2) 1094. 3) 23. 4) 6

AIME: 1) 981. 2) 890. 3) 137. 4) 480

USAMO: 2) 100,000

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MATH CLUBS:
AN ALTERNATIVE TO CONTESTS

by Ashley Reiter, Rice '95

As mathematics competitions increase in scope and popularity, there is also growing concern that highly competitive math environments may discourage some students from continuing their interest in mathematics. Although the publicity that contests receive may suggest that they are the only extracurricular way to enjoy math and problem solving, never fear—alternatives do exist.

In many areas, and for students at many levels, math clubs are becoming more popular. They can provide more opportunities for enrichment for more students, and they are easy to start, whatever your situation. If you're interested in forming a club, first consider these factors:

- **Forum:** *Who will be in your club?*
  Members may be fellow students at your school, homeschooled students in your area, or students from schools city-wide. In larger communities, special interest clubs may also be worthwhile: clubs for women or ethnic minorities, or clubs with a particular purpose such as preparing for a math fair.
- **Focus:** *What will your club do?*
  Club members may invite outside speakers, practice problem solving together, focus on service projects that allow them to use their talents and interests, or take turns preparing presentations on different topics.
- **Funding:** *What will your expenses be, and how will you raise money?*
  For a school group, your own school may be willing to provide some money. For a city club, be sure to consider writing to local corporations and request funding from the area school administration. You may choose to ask students to provide supplies and refreshments for club meetings.
- **Organization:** *Who will run your club?*
  Will parents and teachers sustain the club from year to year, or will students take an active part in planning activities?

A Variety of Formats

Unlike competitions, math clubs have no rules of organization. The following three profiles of math clubs that have "worked" are intended to provide you with examples and ideas and encourage you to start your own club. Don't feel tied to any of these formats; use your creativity to suit your own circumstances.

School Club

Perhaps the most common form of math club is the school club, sponsored by a teacher and meeting at that school. This was the type at the North Carolina School of Science and Mathematics, where I attended high school. Although a faculty member was our sponsor, students served in all leadership positions and planned all of the group's activities.

Typically, evening meetings were held about once a month, with an invited speaker and snacks. (To raise money for refreshments, we sold M.C. Escher T-shirts to students and faculty.) Often, our speakers were visitors to our high school or faculty from local universities. We also sponsored panel discussions about careers in mathematics, inviting local professionals to tell us about how they use mathematics in their careers.

Other sources a math club can draw on for speakers are the local sections of AWM (Association for Women in Mathematics) and SPE (Society of Professional Engineers). These groups, as well as most university math departments, maintain lists of professionals in their organizations who will talk to high school groups.

In addition to inviting speakers, we organized service projects designed to interest younger students in mathematics and give us experience in teaching. These activities included holding a workshop for junior high school math teams and teachers, and assisting at the state MATHCOUNTS contest by helping with scoring and speaking to the alternates during the team competition.

For other service projects, math club members could tutor or serve as mentors for younger students who are working on math projects, are preparing for math competitions, or just need some encouragement to continue in their study of mathematics.

Take advantage of all the opportunities in your community. For example, when professional mathematicians—such as the American Mathematics Society, Mathematical Association of America, or the National Council of Teachers of Mathematics—hold meetings in your area, consider attending as a group or helping with registration.

The school math club is also popular on university campuses, where members invite speakers, arrange social events for mathematics majors, and organize "math day" competitions for area high school students. Among both high school and college math club members, even those who don't really enjoy participating in contests themselves may enjoy organizing them for others.

Issue-related Club

A second type of math club is one that focuses on issues. For example, one that recently started at Rice University, where I am now a student, deals with topics pertaining to women in mathematics. In addition to inviting female speakers from our own and other campuses, we have benefitted from talks by philosophers and anthropologists who study women in mathematics.

We also have biweekly meetings for females interested in math, at which we discuss some issue of relevance (and some of irrelevance) to women studying and working in a predominantly male field. Some weeks, we provide a forum for women who want to practice speaking about their research in a smaller and more congenial environment. This has become an important source of encouragement and camaraderie for women who are dealing with feeling intimidated and frustrated as math majors; such a format could be equally important and successful for high school students. You may find that you're not the only female who enjoys math!

Community Club

Several years ago in my hometown of Charlotte, North Carolina, my father began a community math club. It has been steadily expanding and now has students attending from dozens of schools, some from as far away as one hundred miles. Possibly the most difficult type of club to organize, it can also be one of the most exciting.

This community math club's focus is on problem solving, but it also serves as a social forum. Students learn about the club from their math teachers, friends, or newspaper announcements. Members meet on Saturday mornings about once a month and solve problems individually and in groups. Often, students make presentations about summer programs, other math-oriented opportunities, and new mathematical ideas.

Initially, funding was provided by the local school system, and space was donated by a

☞

MATHCOUNTS:
A Coach's Perspective

This annual contest engages students across the country in grades 7 and 8 whose math knowledge can propel them up the ladder on the school, local, and state levels to the national meet in Washington, D.C. For many, MATHCOUNTS is the primary experience that draws them into the thrilling world of competitive math.

"No other competition does what MATHCOUNTS does in the style that MATHCOUNTS does it," says Darlyn Counihan, veteran math team coach from Takoma Park Middle School in Montgomery County, Maryland.

In the past nine years, Ms. Counihan's MATHCOUNTS teams have won the local and state competitions every single year—and in their worst year, ranked twelfth in the nation. This year, her Maryland team placed sixth in the Washington, D.C., nationals. What's their secret? **Practice, practice, practice.**

She starts out the academic year by inviting students at Takoma Park to try out for the team. Perhaps forty students meet after school once a week to work on problems culled from past meets, pore over books on problem solving strategies, and create their own brain teasers. After the top scorers are chosen to form the MATHCOUNTS team of four members and one alternate, the team may practice for up to five hours on weekends and even enter other math league contests for more practical experience. Chapter, regional, and state meets follow, with top scoring individuals and teams receiving recognition. The coach of the team that finishes first in the state then prepares the state's four highest ranking individuals to represent Maryland at the MATHCOUNTS nationals.

Ms. Counihan offers a few suggestions for new coaches:

- *Talk with more experienced coaches for tips on what has worked well with their teams.*
- *Make good use of the problem and strategy books available through MATHCOUNTS, as well as others such as the Dale Seymour publications and George Polya's* How to Solve It. *("Every coach should read it!")*
- *Run fundraisers, and solicit financial support from the school system and from local professional organizations and businesses. (Ms. Counihan's team operates a paper route to help earn money for contest entry fees and team t-shirts.)*
- *Challenge your students to extend their limits. (Some of Ms. Counihan's students have done well competing at ARML against high schoolers.)*

Ms. Counihan hopes that students who are "hooked" on MATHCOUNTS in middle school will go on to enjoy competing in ARML and other more advanced contests throughout high school.

National Champion Team members from Pennsylvania—(l to r) David Sachs, Adrian Sox, Michael Freiman, and David Baron—won trips to U.S. Space Camp and scholarships from the Cray Research Foundation. (below)

Photos by Art Stein

1994 National Champions

A model of the Washington Monument is built to a scale of one inch to five feet. Given that the volume of the Washington Monument is 1,051,625 cubic feet, how many cubic inches are in the volume of the model?

By correctly answering "8,413 cubic inches" to this question in the oral Countdown Round, William Engel (above) became the '94 MATHCOUNTS National Champion and won an $8,000 scholarship, a personal computer, and a trip to U.S. Space Camp in Huntsville, Alabama.

Individual Rankings:

1. William O. Engel (IL), 2. Michael A. Shulman (CA), also Written Competition Winner, ($8,000), 3. Kevin D. Lacker (OH), also Masters Round Winner, ($4,000), 4. Paul L. Laskowski (AL), 5. Qi Su (WI), 6. Adrian E. Sox (PA), 7. David Baron (PA), 8. Ioana R. Gradinaru (SC), also Top-Scoring Female, ($3,000), 9. Daniel N. DeMoss (OR), 10. Richard C. Chiburis (TX)

Team Rankings:

1. Pennsylvania, 2. California, 3. Texas, 4. Illinois, 5. Indiana, 6. Maryland, 7. Minnesota, 8. Wisconsin, 9. Alabama, 10. Michigan

Continued from page 6

local independent school. More recently, corporations have begun to support the club, providing funding for travel to regional math contests. This has been important for homeschoolers and for students whose small schools can't send a full team.

Although at first the club was geared to grades 8-10, students in grades 7-12 now attend regularly. And a second group has been started for those in grades 4-6, with helpers from the older groups. The younger group meets on Saturday mornings at a local elementary school; funding is provided by the math and science center at the local university.

One advantage of the community math club is the cross-fertilization of ideas and information exchange between students of different schools. The Charlotte club has really developed into a social network; students have kept in touch even after high school, with former members returning to discuss their college experiences.

Whatever type of club you decide to start, you are certain to have fun, meet new people, and learn more math. Remember, there are no rules for starting a math club—all you need is interest! ■

As a high school senior in 1991, ***Ashley Reiter*** *won first place and a $40,000 scholarship in the Westinghouse Science Talent Search for her paper, "Determining the Dimension of Fractals Generated by Pascal's Triangle." Ashley spent this past year studying in Hungary through the Budapest Semesters in Mathematics and has returned to Rice University as a senior.*

ARML:

1994 ARML Winners

Division A: New York City A, Massachusetts A, Thomas Jefferson A (VA), California A, and Montgomery County A (MD) (tied for 4th), and Ontario A.

Division B: Texas Silver, Central Pennsylvania, and Ontario B (tied for 2nd), and Lehigh Valley (PA).

Individual: Nine students achieved perfect scores and competed in the tiebreaker. The three winners were **Noam Shazeer** (Massachusetts A), who received the coveted Julius Hlavarty Trophy; **Kevin Purbhoo** (Ontario A), and **Andrei Gnepp** (Ohio). Perfect scores were also earned by **Jeremy Bem** (Upstate New York A), **Cyrus Hsia** (Ontario A), **James Loudon** (Wisconsin White), **Joshua Nichols-Barrer** (Massachusetts A), **Jim Schneider** (Chicago A), and **Jin Wang** (Minnesota Maroon).

Two ARML/NYSML Contest Books, including problems from 1973-1988, are available from Linda Berman, ARML Treasurer, 241 Central Park West, New York, NY 10024 ($6 for No. 1, $13 for No. 2). A third book, with more recent problems, is due out this fall from MathPro Press.

In less than two decades, ARML has grown from a small regional contest to a national event that is probably the largest on-site mathematics competition in the country, open to participants from all fifty states and Canada. Typically held the first Saturday after Memorial Day, this competition annually draws the nation's finest high school mathematics students, along with a few advanced middle schoolers. They meet, compete, and socialize with one another, forming friendships while sharpening their math skills through the challenge of timed, non-routine problem solving. The atmosphere is intense as young minds interact, and observers soon discover that mathematics can be truly exciting.

Team Selection

No fixed criteria dictate how a team is selected; typically, ARML teams are created out of local interest and commitment. Top scorers in regional events compete on fifteen-member All-Star teams at the state level, and the state then sends an All-Star team or teams to represent it at ARML.

States without such statewide competitions draw ARML teams from math leagues and other contests. For example, in Maryland's Montgomery County, two mathematics leagues were formed, one for high school students, another for middle schoolers. During the 1993-94 school year, nine qualifying meets were held at the high school level, three at the middle school level. Of the 650 students who participated, the sixty highest scorers—forty-five high schoolers and fifteen middle schoolers—were invited to attend ARML practices. The resulting Montgomery County ARML team met two hours a week for thirteen weeks to prepare for the competition on Saturday, June 4.

One Intense Day

For the annual ARML meet, students arrive at Penn State or the University of Iowa late Friday afternoon. They move into their rooms, then have the rest of the evening free to explore the campus and hang out with fellow math aficionados. The real fun begins after breakfast the next morning when the meet officially opens and months of practice are put to the test.

Since the very best young math competitors in America attend ARML each year, the team and individual problems posed to them must be challenging, provocative, and ingenious. (Samples from ARML '94 appear below.)

The Team Round consists of ten short-answer questions on which all fifteen team members work cooperatively, using various strategies for swift and accurate completion within the imposed time limit of twenty minutes.

1. If $x^5 + 5x^4 + 10x^3 + 10x^2 + 5x + 1 = 10$ and $x \neq -1$, compute the numerical value of $(x + 1)^3$.
2. The parabola $y = ax^2 + 19x$, where a is an integer, passes through two lattice points in quadrant I whose ordinates [y-coordinates] are primes. Compute the (x and y) coordinates of both of those points.
3. Point P is inside a rectangular box. The distances from point P to four of the vertices of the box are 1, 2, 3, and 4. If the distance from P to another vertex is greater than 5, find that distance.

The ***Power Round*** which follows forces the team to use diverse methods of mathematical analysis and proof to solve a challenging multi-part problem, usually focused on a single mathematical theme. Success requires in-depth analysis and original thinking on the part of the entire team. Team members have one hour to submit their conclusions in report form.

Lattice Points: This question refers to figures in a 2-dimensional rectangular coordinate system only. Lattice points are points on a grid, both of whose coordinates are integers. A lattice segment is a line segment whose endpoints are lattice points; an oblique lattice segment is one that is not parallel to either axis.

The letter ℓ will represent the length of a lattice segment, as well as the segment itself. Let $N(\ell)$ represent the number of lattice points on a lattice segment of length ℓ, not including its endpoints. [For example, $N(2)=0$; $N(17)=0$ if the segment is oblique, and $N(17)=16$ if the segment is not oblique.]

Segments

1. Compute $N(\ell)$ for the lattice segment ℓ whose endpoints are **a.** (0,0) and (1,4) **b.** (0,0) and (12,16) **c.** (0,0) and (300,400) **d.** (-3,11) and (57,101).
2. Compute all possible values for $N(\ell)$ if ℓ is oblique and **a.** $\ell = 13$ **b.** $\ell = 4 \cdot 13$ **c.** $\ell = 5 \cdot 13$. (Be sure to consider all possible oblique positions for ℓ.)
3. Compute the number of different possible values for $N(\ell)$ if ℓ is oblique and $\ell = 5 \cdot 13 \cdot 17$.

On June 4, 1994, the nineteenth annual meet of the American Regions Mathematics League was held simultaneously at Pennsylvania State University and the University of Iowa. Participating were squads of three teams of fifteen members each.

Members of the Howard County (MD) ARML '94 team pose with their coach, Charles Koppelman.

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A lattice polygon is a polygon whose vertices are lattice points; an oblique lattice polygon is one whose sides are all oblique.

Pick's Theorem: The area of any lattice polygon is given by $K = \frac{1}{2}B + I - 1$ [where K is the area, B is the number of lattice points on the boundary (sides and vertices) of the polygon, and I is the number of lattice points in the interior of the polygon].

Polygons

4. Compute the value of I (the number of interior lattice points) for the triangle whose vertices are (1,2), (31,42), and (81,-78). **Show all work.**
5. a. Compute the maximum value of I for a lattice square whose side is 25.
   b. Compute the maximum value of I for a lattice square whose side is 26.
6. Show that if two sides of an oblique lattice triangle are 5 and 13, then the third side cannot be an integer.
7. a. Given any 5 lattice points, show that there is a segment joining two of them that contains a lattice point (other than the endpoints of the segment).
   b. Prove that every convex lattice pentagon must contain an interior lattice point.
   c. A "trapezium" is a quadrilateral with no pair of parallel sides. For a convex lattice trapezium:
      (1) Show that if 2 successive sides each contain a lattice point (other than the vertices), then there is a lattice point in the interior of the trapezium.
      (2) Show that if there are two opposite sides neither of which contains a lattice point (other than the vertices), then there is a lattice point in the interior of the trapezium. [Together, these show that every convex lattice trapezium must contain an interior lattice point.]
8. If the product of two sides of a lattice triangle is a prime, and the area is also a prime, prove that the area must be 2.

After lunch, contestants gather in a large auditorium for the ***Individual Round***, during which they work independently on a set of eight short-answer questions with a ten-minute time limit per question pair. The day's individual rankings are determined during these few minutes, with short-answer ***Tiebreakers*** used to resolve the final order of the top scorers.

1. A tangent from the point $(2 \cdot 1994, 2 \cdot 1994)$ to the circle $x^2 + y^2 = 1994^2$ touches the circle at the point (a,b). Compute $a+b$.
2. Silas once had between 30 and 35 special coins, each marked with a different "value." These values were successive powers of 2, namely: 1,2,4,8,.... Some of these coins were then lost. The total value of the lost coins was exactly 1/5 of the total value of all the original coins. Compute the number of lost coins.

Finally, the ***Relay Round*** sets up five three-member subteams within each ARML team. Students take turns solving problems, with the answer to the first question being passed on for use in completing the next question. Credit is given on the three- to six-minute relay only if the final team member answers correctly.

Well-Deserved Honors

ARML's judges are busy scoring papers throughout the day. The Relay Round is followed immediately by the Awards Ceremony, during which special recognition goes to the highest scoring individuals and teams. All ARML participants receive certificates and a complete set of sample solutions, which promise hours of intellectual stimulation and offer challenging material for further mathematical research and possible student projects.

Multiple Benefits

ARML provides most participants with their first taste of the college experience. Competitors stay in the university dorms, eat in the dining halls, and take in the special environment that a college campus offers. In addition, the competition itself pushes students beyond what they may have thought they could accomplish; many believe that they come away from ARML as better math students. And a very high percentage of ARML competitors go on to pursue higher education in mathematics and to work in math-related fields.

Susan Collins *is an Assistant Coordinator for CTY Young Students Academic Programs and a professional private math tutor who has proctored ARML meets for several years. Her son Jeremy is a four-year veteran of ARML, which he first entered in 7th grade.*

Special thanks are extended to Barbara Rockow, Andre Samson, ARML Historian, and Eric Walstein, ARML Mid-Atlantic Regional Representative, for their assistance with this article.

Answers to Team and Individual questions

T1: 10; T2: (1,13) and (3,3); T3: $\sqrt{27}$; I1: 997; I2: 16

ARML-Russian Exchange Program

For the past four summers, ARML has sponsored exchange programs between top math students in the U.S. and Russia. In 1991, ARML and the National Science Foundation sent twenty-five American high school students and five mathematics teachers to Tartu, Estonia. There they were joined by Russian and Ukrainian students and teachers for a two-week advanced math camp run by the Institute for New Technologies in Moscow.

In 1993, ARML sent twenty high school students to Moscow to work with Russian students selected by Symposia Conferences Moscow. The participants, who were all required to have broad experience in problem solving and non-traditional mathematical topics, worked for about four hours each morning in advanced math workshops. An American student described one highlight of this shared experience, the Math Battle: "We tested the limits of our mathematical prowess and endurance in six hours of concentrated debate over complex math proofs."

In 1992 and 1994, a team of Russian high school students stayed with Montgomery County ARML participants and competed at ARML (in '92 at Penn State; in '94, at the University of Iowa). Tentative plans are for American students to return to Moscow next summer for a two-week math camp and a special symposium called the Tournament of Towns, at which some of the best Russian math students assemble.

My family had the pleasure of hosting Sergei Krupenin from School 57 in Moscow this past June. Before the ARML meet, he attended Montgomery Blair High, a math and science magnet school, with our son Jeremy. Sergei loved American food (especially pizza and McDonalds), enjoyed learning to use a TI-85 calculator, and found computer games and Nintendo "quite amazing." His visit was so exciting for our family that we look forward to welcoming another Russian student for a future ARML.

—Susan Collins

"For me, ARML was a broadening experience, and I feel better prepared to face the challenges of college-level math. There was a slight language barrier, but we all spoke mathematics."

—Sergei Krupenin, 17, now an MIT freshman.

"ARML provides a wonderful learning experience for advanced mathematics students. Even though I am just entering ninth grade this year, I have been on my high school's team for two years, gaining invaluable experience and learning more advanced topics along the way."

—Alok Bhushan, 14 (VA)

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Math by Mail

Gelfand Outreach Program in Mathematics

Operated through Rutgers University, the Gelfand Outreach Program in Mathematics uses non-standard problem solving models in algebra, geometry, and analytical geometry to encourage students in grades 8-12 to develop their mathematical ability. After a math aptitude entrance exam, students work either individually or in groups to complete monthly assignments. The solutions and explanations they submit are reviewed and commented on by faculty members and graduate students in the Department of Mathematics. The program was established and is directed by eminent mathematician Professor I.M. Gelfand, who founded the Mathematics Correspondence School in the Soviet Union thirty years ago.

Three texts are used in the three-level program: *The Method of Coordinates, Functions and Graphs,* and *Algebra.* Students receive certificates for the successful completion of each year/level. Some scholarships are available.

Harriet Schweitzer, Center for Mathematics, Science, and Computer Education, SERC Building, Room 239, Busch Campus, Rutgers University, Piscataway, NJ 08855-1179; (908) 932-0669, fax (908) 932-3477.

MATHE*graphics*

The Duke University Talent Identification Program (TIP) offers an educational program that uses the TI-81 Graphics Calculator as a tool of analysis and mathematical modeling with Algebra I through Precalculus coursework. The complete package includes the Texas Instruments calculator, *Using the TI-81 Graphics Calculator to Explore Functions* by Dr. Brendan Kelly, and a year's subscription to the quarterly newsletter **Mathe***graphics.*

TIP also offers correspondence courses in Algebra I, Algebra II, and Geometry through its **Learn-On-Your-Own** program.

Duke University Talent Identification Program, P.O. Box 40077, Durham, NC 27706-0077; (919) 684-3847.

Letter-Links Learning Program

Through the Center for Talent Development (CTD) at Northwestern University, students in grades 6-12 may take honors level correspondence courses in Algebra I, Algebra II, Geometry, and Analysis. Eligibility is based on SAT/ACT scores. Strong independent study skills and a minimum of four-six hours a week are required to complete the assignments, which are graded by an experienced instructor. Courses start the first of October, January, March, or June and run for nine months.

Center for Talent Development, Northwestern University, School of Education, 2003 Sheridan Road, Evanston, IL 60208; (708) 491-3782, fax (708) 467-4283.

Stanford's Education Program for Gifted Youth (EPGY)

The Stanford University EPGY offers a *self-paced, computer-based* curriculum in mathematics and physics to academically talented students.

EPGY presents three groups of courses beyond elementary school math:*

- **Secondary school course sequence**—beginning algebra, intermediate algebra, precalculus, and logic of algebra.
- **Advanced Placement courses,** designed to prepare students for the College Board AP exams—Calculus AB, Calculus BC, Physics C: Mechanics, and Physics C: Electricity and Magnetism.
- **University level courses,** following Stanford University syllabi.

Students who are willing to work hard and whose scores on qualifying exams indicate their ability to learn advanced math and physics may progress through the standard secondary school math curriculum and move into university-level courses before they leave high school.

EPGY provides user-friendly software for each course, backed up with tutorial support by e-mail and telephone; the student must have access to a compatible computer and modem. The current minimal requirements are a 386 or 486 machine with at least 4 MB RAM, Windows 3.1, and 20 MB free on the hard drive, a 9600 baud (or better) modem, a 16-bit sound card, and a compatible CD-ROM. Many students work on EPGY at home after school, although some schools have allowed advanced students to work on EPGY curricula during the school day; for example, an 8th grader might study EPGY calculus individually on a school computer while others are learning 8th grade math.

Each course's software includes an interactive component. The student works through the menu of lessons at his or her own comfort level, pausing, repeating, or fast forwarding at will. For each lesson, the lecturer's voice is heard while information appears on screen; the viewer may choose to view this information as either handwritten or formatted text. The intention is to replace textbook formality with a more informal, classroom style of teaching.

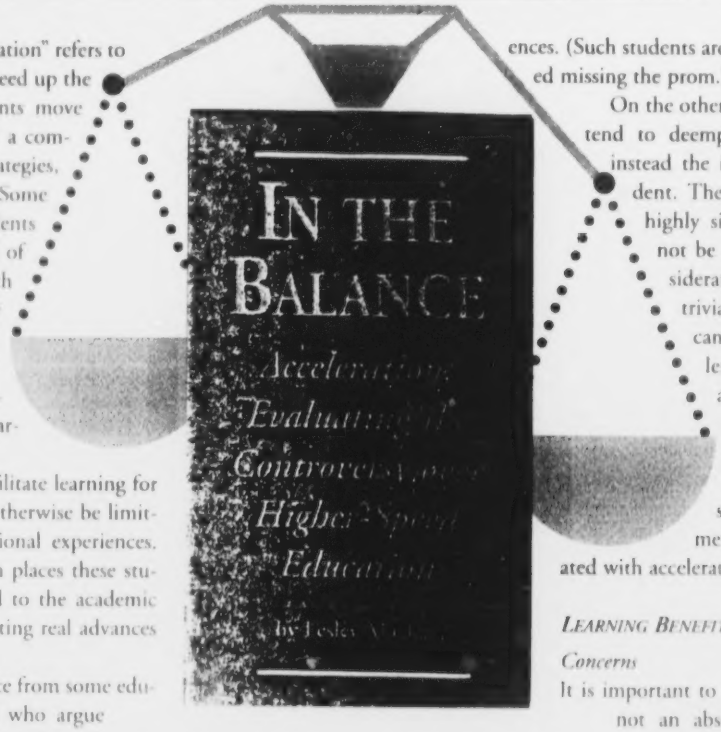
After hearing the lecture, the student completes a quiz, which the program corrects immediately. If the results show that the student is having difficulty, a follow-up lecture appears.

A student is expected to spend at least forty minutes on line five times a week, as well as a like amount of time off line doing homework from textbooks and taking timed exams. After the student enters answers into the exam checker, the program automatically e-mails the entire lesson to Stanford, where professors and graduate students keep track of the student's progress and respond within hours. The student is also encouraged to comment or ask questions by e-mail or telephone.

Courses are offered year-round. Students admitted into EPGY enroll in the Stanford Continuing Studies Program (CSP). For successfully completing each course (including scoring at least 86% on a two-three hour final exam), students receive CSP credit and a transcript bearing the Stanford Registrar's seal.

EPGY, Ventura Hall, Stanford CA 94305-4115; (415) 723-0512, fax (415) 725-7992; Internet: ravaglia@epgy.stanford.edu

Also available is **Standard K-8 material, using the Sets and Numbers textbook series developed by Professor Patrick Suppes, EPGY's founder.*



In education, the term "acceleration" refers to the many strategies used to speed up the rate at which talented students move through academic curricula. (For a comprehensive list of accelerative strategies, see the boxes on pages 12-13.) Some forms of acceleration move students out of learning groups composed of their age-peers, placing them with students who may be significantly older. But acceleration is also often subject-based, allowing students to maintain ties with same-age peers while forging ahead in particular academic areas.

Acceleration is intended to facilitate learning for highly able students who might otherwise be limited to a diet of repetitive educational experiences. Supporters claim that acceleration places these students where they will be exposed to the academic challenges they need, thus promoting real advances in their skills and understanding.

Yet acceleration sparks resistance from some educators, parents, and other critics who argue that acceleration rushes students through school, putting students' social, emotional, and even intellectual development at risk.

Today's important educational questions are too often discussed in ways that distort the issues. Educational strategies are held to be invalid when they are simply in need of modification. Different theories and practices of teaching and learning are pitted against each other as if they were incompatible. Thus, cooperative learning comes to be viewed as being at odds with ability grouping; enrichment is seen as being opposed to acceleration. This unproductive climate of debate makes it difficult to achieve a clear understanding of different educational ideas and options.

Our series "In the Balance" is intended to offer a comprehensive, reasoned look at the complexities of some crucial educational issues. We began in Imagine's March/April 1994 issue with an analysis of the merits of ability grouping and cooperative learning. Here we explore acceleration and enrichment. And in the next issue, we will focus on the influence of feminism, multiculturalism, and other progressive agendas on academic programs.

The Debate

The debate over acceleration is heightened by a tendency to view the practice in terms of its most pronounced forms, such as grade skipping. While the pros and cons of different kinds of acceleration, including grade skipping, should be examined, it is important to remember that there are also forms of acceleration that do not bring major changes to students' lives. For example, the precollege Advanced Placement Program provides a popular, easily utilized accelerative learning experience in hundreds of high schools across the country.

Impact on Social and Emotional Adjustment

At the heart of the dispute over some accelerative strategies are differing views of their effects, especially on social and emotional adjustment. Those who express doubts about acceleration tend to affirm the importance of biological age, asserting that children need to develop among peers who mirror their own levels of physical, emotional, and social development.

From this perspective, acceleration may disrupt patterns of experience and rites of passage that typically characterize the precollege years. A student who takes night courses in mathematics at a local university may need to give up high school dramatics or athletics. Another who skips the twelfth grade may miss out on some traditional social experiences. (Such students are often asked whether they minded missing the prom.)

On the other hand, supporters of acceleration tend to deemphasize biological age, stressing instead the intellectual readiness of the student. They see intellectual readiness as a highly significant trait, one that should not be sacrificed in favor of other considerations. According to this view, trivializing students' potential to learn can itself create adjustment problems. Highly able students are already different from many of their classmates. Forcing them to repress their learning capacities may indeed hinder their social and emotional development more than any stresses associated with acceleration.

Learning Benefits

Concerns

It is important to acknowledge that acceleration is not an absolute good and that its likely impact on the skills and understanding of each student must be considered individually.

Educators tend to be very conservative in recommending acceleration, so that many talented students advance more slowly than their abilities and achievements indicate that they could. Nevertheless, questions of thoroughness *are* important in planning any student's academic career.

Students who are excellent in arithmetic may not be ready to deal with the more advanced concepts important in algebra and geometry. Students with high verbal aptitudes may not be prepared to grapple with novels by William Faulkner. Ideally, prior academic performance, ability tests, and the student's own disposition should all contribute to decisions about readiness to move ahead.

Positive Considerations

What do students say about acceleration? Those who have chosen to learn more rapidly and who have been permitted to do so tend to be positively enthusiastic about accelerative options.

Dr. Jane C. Charlton, a former "radical accelerant," is now assistant professor of astrophysics at Pennsylvania State University. Dr. Charlton, who received her Ph.D. at age 22 from the University of Chicago, took her first college-level course at the age of 13 after she had completed the seventh grade. She then decided to begin full-time college-level studies at age 14.

With an outstanding academic background and an exciting professional future, Dr. Charlton now credits acceleration with being the key

that opened up the substantial challenges she needed as a talented, curious, and hardworking student. Accelerating allowed her to probe and act on her talents. "And the amazing thing," she adds, "is that I am where I always wanted to be four years sooner than I might have been had I not accelerated."

Dr. Charlton's example, though very unusual, illustrates acceleration's capacity to help outstanding students make good use of their time and, relatedly, avoid boredom. Acceleration's potential as an escape hatch from boredom is extremely important. The lack of challenge that good students may sometimes feel in school is not only tragic, it's damaging.

Dr. Julian Stanley, Director of the Study of Mathematically Precocious Youth at The Johns Hopkins University, believes that adhering to conventional academic timetables can compromise the futures of highly able students.

While the accelerants with whom Dr. Stanley works have almost all enjoyed very successful college careers, talented students who complete high school entirely in step with their age-peers may have more trouble in college. One possible explanation: academic boredom at a young age can lead to lack of motivation and less developed work habits, traits that pose problems as students mature and face tougher academic challenges.

Not Just Place, but Pace

In order to gain a perspective on the debate over acceleration, consider that certain accelerative options allow students to modify not only their **place**—the *level* at which they are learning—but also their **pace**—the *rate* at which they are learning. Strategies that allow for the ongoing adjustment of pace, such as continuous progress, self-paced instruction, and curriculum compacting, ensure that students are not merely jumping ahead, but also advancing at an optimal rate.

Unfortunately, not every school offers or is currently able to offer a variety of accelerative options. However, a full range of accelerative possibilities, including those that permit the ongoing adjustment of pace, is necessary to enable students to move ahead appropriately. Diverse options ensure the responsiveness of the learning environment; it is this responsiveness that is the key to the benefits of acceleration. Intellectually talented boys and girls need to work cooperatively with parents and teachers to find special, supplementary, accelerative educational opportunities.

Acceleration Options

Early entrance to kindergarten: The student is admitted to school prior to the age customarily specified by the district for entry into first grade.

Grade skipping: The student moves ahead of normal grade placement. This may be done during an academic year (e.g., a third grader goes directly into fourth grade; skips the last two years of high school to enter college), or at year end (e.g., a third grader is promoted to fifth grade).

Continuous progress: The student is given material deemed appropriate for current achievement as the student becomes ready.

Self-paced instruction: The student is presented with materials that allow him or her to proceed at a self-selected pace.

Subject-matter acceleration: Without being assigned to a higher grade, the student is placed for part of the day with students at more advanced grade levels for one or more subjects (e.g., a fifth grader goes to sixth grade for science instruction).

Combined classes: The student is placed in classes where two or more grade levels are combined (e.g., third and fourth grades split rooms). The arrangement can be used to allow younger children to interact with older ones academically and socially.

Curriculum compacting: The student is given reduced amounts of introductory activities, drill, and review. The time saved may be used to move more quickly through the curriculum.

Telescoping curriculum: The student spends less time than usual in a course of study (e.g., completes a one-year course in one semester or finishes junior high school in two years rather than three).

Mentorships: The student is exposed to a mentor who provides advanced training, experiences, and pacing in a content area.

(Continued)

Flexible Pacing for All

Talented students' need for flexible learning environments has implications for all students, regardless of whether they need to accelerate. An ongoing commitment to provide the conditions that can nurture the abilities of each student should be central to any understanding of the task of education.

The needs of highly able students are in this sense no different from those of others: each learner needs access to the material for which he or she is ready, as well as the freedom to advance at a personally appropriate pace. When these conditions are met, students are liberated to work in a zone of ideal challenge.

For some students, acceleration is critical to achieving this Optimal Match. For all students, correct placement and an appropriate tempo of progress are the basic ingredients of genuine education.

Parents and teachers should encourage consideration of accelerative options; a hands-off approach on the part of adults can be detrimental. But a critical part of the Optimal Match is listening to the voice of the student.

As much as considerations such as age allow, students should guide the decisions made about their own education. As one experienced educator put it, acceleration is least successful when implemented at the urgings of an adult; it is most beneficial when students decide on it for themselves, in an atmosphere in which they are free to make the choice. ■

Postscript

Acceleration was the focus of a conference on "Adolescence, Acceleration, and National Excellence" held in June at Simon's Rock College of Bard in Great Barrington, Massachusetts. Conference participants, including educators and former accelerants such as Dr. Jane Charlton, discussed issues related to acceleration. As Brian Hopewell, the Conference Chair, noted in his welcoming letter to the conferees, "While acceleration is clearly not a novel phenomenon, fundamental pedagogical, developmental, and policy issues remain unresolved."

The Enrichment Option

Enrichment adds extra breadth and depth to students' learning, taking education beyond the bounds of typical curricula; it does not speed up the rate at which students advance through academic programs.

Enrichment is often viewed as an alternative to acceleration and is favored by some educators who resist the idea of more rapid advancement for talented students. But there is no reason to view acceleration and enrichment as opposing educational approaches; both can make valuable, mutually supportive contributions to students' learning.

In fact, enrichment is a natural byproduct of acceleration. When a student accelerates, he or she has more time not just to move ahead, but also to learn more—to make a more profound, "enriched" exploration of his or her subject.

But while acceleration may lend itself to enrichment, current enrichment programs usually entail no accelerative options or effects. These supplementary academic programs award no credit or advanced standing; programs that do provide these benefits are accelerative.

Let's consider some examples of the countless enrichment programs available at many schools and elsewhere. Some enrichment offerings may be provided by a particular school or school district, while others are private or community programs available to students or to the general public. Enrichment may include a Greek mythology unit added to a language arts curriculum; a supplementary art history course offered at a local museum; math or science contests, such as the Westinghouse Science Talent Search; and many non-accelerative academic summer programs.

As excellent as many of these programs are, they cannot meet the needs of a student who is ready to move decisively ahead in a particular field. Acceleration cannot be replaced by enrichment.

And shouldn't many enrichment options be offered to all, not just talented, students? Opportunities for deeper learning should be made more broadly available. Nevertheless, enrichment adds an important component to talented students' learning options. ■

Extracurricular programs: The student is enrolled in course work or summer programs that confer advanced instruction and/or credit for study (e.g., fast-paced language or math courses offered by universities).

Concurrent enrollment: The student takes a course at one level and receives credit for successful completion of a parallel course at a higher level (e.g., takes algebra when in junior high and receives credit for both high school algebra and junior high math, or takes a college physics course in lieu of high school physics).

Early graduation: The student graduates from high school or college in 3-1/2 years or less.

Advanced placement: The student takes a course in high school in preparation for an examination that may confer college credit for satisfactory performance.

Credit by examination: The student receives credit (at high school or college level) upon successful completion of an examination.

Correspondence courses: The student takes high school or college courses by mail, video, or audio course presentation.

Early entrance into junior high, high school, or college: The student is admitted with full standing to an advanced level of instruction at least one year early.

Acceleration in college: The student completes two or more majors in a total of four years and/or earns a master's degree along with the bachelor's.

From Southern, W.T., Jones, E.D., & Stanley, J.C. (1993). Acceleration and enrichment: The context and development of program options. In K.A. Heller, F.J. Monks, & A.H. Passow (Eds.), *International Handbook of Research and Development of Giftedness and Talent* (pp. 387-409). New York: Pergamon.

Suggested Reading: *The Academic Acceleration of Gifted Children*, edited by W. Thomas Southern and Eric D. Jones, Teachers College Press, 1991.

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What Does the Research Say?

Effects of Acceleration on Talented Students

In 1984, James A. Kulik and Chen-Lin C. Kulik published the findings of a broad meta-analysis—a "statistical analysis of a large collection of results from individual studies for the purpose of integrating the findings"—on the effects of accelerated instruction on elementary and secondary school students.[1]

According to their findings, acceleration promotes students' intellectual development. "The analysis showed that examination performance of accelerates surpassed by nearly one grade level the performance of nonaccelerates of equivalent age and intelligence. Examination scores of accelerates were equivalent to those of same-grade but older, talented nonaccelerates."

The Kuliks' meta-analysis is peppered with references to the studies it surveys that attest to the learning benefits of acceleration. They endorse the conclusion of one researcher who stated in the late 1950s that it was "hard to find a single research study showing acceleration to be harmful and that many studies proved acceleration to be a satisfactory method of challenging able students."

The Kuliks go on to probe the paradox of why the consistently favorable results of studies on the learning benefits of acceleration have not been taken to heart by most educators, who often resist this strategy. They refer to one analyst who suggested that North American cultural values favor patterns of dependency in youth instead of the "social or individual need for achievement and independence."

Adjustment

The Kuliks did not discover consistent findings on the effects of acceleration on students' social and emotional adjustment. However, in an analysis published in 1983 based on a review of the literature investigating this question, Lynn Daggett Pollins confirmed that "not one study has found acceleration to harm the social and emotional development of gifted students permanently or severely."[2] ■

1. Kulik, J.A., & Kulik, C.C. (1984, Fall). Effects of accelerated instruction on students. *Review of Education Research*, 54, 409-425.

2. Pollins, L.D. (1983). The effects of acceleration on the social and emotional development of gifted students. In C.P. Benbow & J.C. Stanley (Eds.), *Academic Precocity: Aspects of Its Development*. Baltimore, MD: Johns Hopkins University Press.

FASCINATING CLASSICS

EMMA

by Lesley Mackay & Amanda Claybaugh

In this new series, two of our writers will compare their views on well-known literary works. They begin here by discussing Jane Austen's Emma. First, we listen in on a few moments of the conversation that preceded the writing of their separate essays.

Amanda: *"One of my strongest impressions of Emma is of the sheltered lives most of its characters live. Do you feel attracted to the world Jane Austen describes in Emma?"*

Lesley: *"Well, I have to admit that my life does not have much in common with Emma's life. I don't immediately relate to a world in which grown-up people panic at the thought of the summer sun or a shower of rain. At the same time, I did enjoy Austen's portrait of a community that fits harmoniously together."*

Amanda: *"I'm not sure I agree with you about the harmony. Think about the poor people or the gypsies whom Harriet Smith encounters. Where do they fit in? But . . ."*

Amanda: Although *Emma* was written nearly two hundred years ago, there is much about it that seems familiar. The characters may wear long dresses and frock coats, but they spend their time going to parties, falling in love, making matches, and carrying on intrigues. The narrator may use old-fashioned punctuation, but she has a wicked sense of humor.

Lesley Mackay

Still, certain details will keep reminding you that this is a novel set in the early nineteenth century. You may need a dictionary to tell you that "quadrille" is a card game; you may need a footnote to explain that first names are almost never properly used. And unless you know that a "natural child" was one born outside marriage, you'll probably be confused by the unfortunate social status of Harriet Smith.

Even after you know that Harriet is legally fatherless, you may still be unclear about the burden this places on her. The hardest thing to understand about *Emma*—and the hardest thing to accept—is its support of rigid social distinctions. Everyone in this novel is expected to comprehend his or her general place in the social hierarchy, and the few who try to rise above that place encounter offended resistance.

Snobbishness pervades this novel, and even the most sympathetic characters share it. No matter how much you may like Emma and sympathize with her, you'll probably be taken aback by her first opinion of Robert Martin: "A young farmer," she says to Harriet Smith, "is the very last sort of person to raise my curiosity. . . . A farmer can need none of my help, and is therefore in one sense as much above my notice as in every other way he is below it." And while Mr. Knightley treats Harriet with great kindness and generosity, he still describes her as "the natural daughter of nobody knows whom, with . . . no respectable relations."

Remarks like these are not incidental. They reflect a system of values in which social status is nearly unchanging, in which birth matters more than anything else. Money is not that important. The impoverished Miss Bates may live crowded with her elderly mother in two rooms over a store, but she still deserves respect because she was born a vicar's daughter. All of Mrs. Elton's ten thousand pounds cannot compensate for the fact that her father was once a merchant.

In a society like this, marriages must be carefully made. Love matters less than it might at first seem. When Emma claims credit for encouraging the match between Miss Taylor and Mr. Weston, Mr. Knightley admonishes her for such inappropriate activity. Calling Miss Taylor a "rational" woman and Mr. Weston a "straight forward" man, Mr. Knightley tells Emma that they could have been "safely left to manage their own concerns." Emma seems to believe that love is a passionate feeling born of "gallantry" and "little encouragements"; Mr. Knightley knows, however, that marriage is a contract best made between people of prudence and good sense.

By the time the novel ends, four engagements have been made. Despite the false hopes and misleading flirtations of the preceding year, the couples that emerge are all perfectly matched. The heiress of Hartfield marries the heir of Donwell Abbey. The virtuous young people of humble birth marry one another, as do the socially ambitious. All of them have found their proper places. The social order has been affirmed.

Lesley: As Amanda comments, Jane Austen's most celebrated novel endorses the social system that orders its characters' lives. At the same time, it offers much more than a witty validation of the status quo. *Emma*'s social world is made up of players, all of whom must understand not only their place, but the rules of conduct that bind them.

Amanda Claybaugh

Despite its humor, romance, and suspense, *Emma* is an almost severe novel of moral education. Its pretty and witty heroine passes through a series of sometimes painful moral lessons. The promise of happiness she eventually attains comes not just because her marriage is socially appropriate; it comes because Emma realizes she has acted with "insufferable vanity" and "unpardonable arrogance."

Emma's vanity and arrogance are illustrated by her matchmaking, which shows her capacity to disregard social considerations. But if we look closer, we will see that the "crimes" she and others commit are not just sins against the social order. The risks Emma takes with Harriet's feelings, her rudeness to Miss Bates at the Box Hill picnic, and Mr. Elton's humiliation of Harriet at the ball are hurtful acts in which more than social propriety is violated.

Of course, it is Mr. Knightley who serves as the outspoken—and intriguing—guide in Emma's ethical development. Some of you may feel that his attitude towards Emma is condescending; others may fall for romantic undertones in his devotion to improving her.

☞

More Good Books...

Each year the U.S. Presidential Scholars Program recognizes and honors up to 141 distinguished high school seniors.* Applicants are asked to name the most stimulating book they have read outside school in the past six months. The following were among those chosen by the 1994 Presidential Scholars. (Books named in the Sept./Oct. '93 issue of *Imagine* are not repeated here.)

FICTION

Margaret Atwood, *The Handmaid's Tale*
Jean M. Auel, *The Clan of the Cave Bear*
Ray Bradbury, *Fahrenheit 451, Something Wicked This Way Comes*
Anthony Burgess, *A Clockwork Orange*
Arthur Clarke and Gentry Lee, *The Garden of Rama*
Sandra Cisneros, *Woman Hollering Creek*
Alexandre Dumas, *The Three Musketeers*
Marguerite Duras, *The Lover*
Umberto Eco, *Foucault's Pendulum*
Gustave Flaubert, *Madame Bovary*
Robert Harris, *Fatherland*
Hermann Hesse, *Demian: The Story of Emil Sinclair's Youth, Im Nebel*
Homer, *The Iliad*
Victor Hugo, *The Hunchback of Notre Dame*
Franz Kafka, *The Trial*
Jack Kerouac, *On the Road*
Ken Kesey, *One Flew Over the Cuckoo's Nest*
D.H. Lawrence, *Sons and Lovers*
Alan Lightman, *Einstein's Dreams*
Toni Morrison, *Song of Solomon*
Tim O'Brien, *Going after Cacciato*
Michael Ondaatje, *The English Patient*
Norman Rush, *Mating*
Carl Sagan, *Contact: A Novel*
Anya Seton, *Katherine*
Upton Sinclair, *The Jungle*
John Steinbeck, *The Winter of Our Discontent*
Mary Stewart, *The Wicked Day*
Anne Tyler, *Dinner at the Homesick Restaurant*
Alice Walker, *The Color Purple*
Roger Zelazny, *Nine Princes in Amber*

DRAMA

Albert Camus, *Caligula, The Myth of Sisyphus*

INTERNATIONAL THEMES

Chinua Achebe, *Things Fall Apart*
Keri Hulme, *The Bone People*
Federico Garcia Lorca, *Selected Poems*
Octavio Paz, *The Labyrinth of Solitude*
Alexander Solzhenitsyn, *One Day in the Life of Ivan Denisovich*

AUTOBIOGRAPHY/BIOGRAPHY

The Autobiography of Benjamin Franklin
James Gleick, *Genius: The Life and Science of Richard Feynman*
Maxine Hong Kingston, *The Woman Warrior: Memoirs of a Girlhood among Ghosts*
Gelsey Kirkland, *Dancing on My Grave*
Nathan McCall, *Makes Me Wanna Holler: A Young Black Man in America*
Rigoberta Menchu, *I, Rigoberta Menchu: An Indian Woman in Guatamala*
Fred Waitzkin, *Searching for Bobby Fischer: The World of Chess, Observed by the Father of a Child Prodigy*

PSYCHOLOGY, PHILOSOPHY, RELIGION, INSPIRATIONAL

Annie Dillard, *The Writing Life*
Soren Kierkegaard, *The Concept of Dread*
C.S. Lewis, *The Joyful Christian, Mere Christianity*
Sandra Martz, *If I Had My Life to Live Over, I Would Pick More Daisies*
Robert Pirsig, *Zen and the Art of Motorcycle Maintenance*
Anthony Robbins, *Awaken the Giant Within*
Bertrand Russell, *A History of Western Philosophy*
Oliver Sacks, *The Man Who Mistook His Wife for a Hat*
Huston Smith, *Essays on World Religion*
Lin Yutang (translator), *The Wisdom of Laotse*

HISTORY, SOCIOLOGY, POLITICS

Alan Bullock, *Hitler: A Study in Tyranny*
Nien Cheng, *Life and Death in Shanghai*
Zlata Filipovic, *Zlata's Diary: A Child's Life in Sarajevo*
Alastair Hamilton, *The Appeal of Fascism*
Joseph Horowitz, *The Ivory Trade: Music and the Business of Music at the Van Cliburn International Piano Competition*
Paul Kennedy, *Preparing for the Twenty-first Century*
Jonathan Kozol, *Savage Inequalities: Children in America's Schools*
Flora Lewis, *Europe: Road to Unity*
Ken Magis and Carole McKelvey, *High Risk: Children without a Conscience*
Christopher Matthews, *Hardball: How Politics is Played—Told by One Who Knows the Game*
Camille Paglia, *Sexual Personae: Art and Decadence from Nefertiti to Emily Dickinson*
Randy Shilts, *And the Band Played On: Politics, People, and the AIDS Epidemic*
Gay Talese, *The Kingdom and the Power*

MATH, SCIENCE, TECHNOLOGY

James Burke, *The Day the Universe Changed*
Marian Stamp Dawkins, *Through Our Eyes Only? The Search for Animal Consciousness*
K. Eric Drexler, *Engines of Creation*

* To receive an application to become a Presidential Scholar, you must (a) take the SAT or ACT any time from October of your junior year to November of your senior year, (b) score exceptionally well, and (c) check the box that indicates your interest in the Student Search Service (if SAT) or Educational Opportunity Service (if ACT). To avoid disappointment, check the box every time you take the test.

Continued from page 14

Emma's bond with Mr. Knightley is perfectly proper. A less conventional kind of romance is introduced through the relationship of Jane Fairfax and Frank Churchill; the suspense and passion that color their friendship add a great deal to the novel. Emma thought Jane Fairfax was cold and unloved, but Jane was neither. Once again, Emma was wrong—in this case, blinded by envy. Emma's regret over her mistreatment of Jane is one of the key signs that she has grown up, and that she deserves the full blessings of her social position.

Emma is about good manners, but it strongly suggests that good manners extend to other virtues. In the world of this novel, to be courteous—like Mr. Woodhouse or, more heroically, Mr. Knightley—is to be a good person. On the night of the ball, we listen in as Emma is almost overwhelmed by Mr. Knightley's charms. She is impressed by his grace, both natural and social; as she watches him, he nobly rescues Harriet from the callous Mr. Elton. Jane Austen seems to be telling us that Mr. Knightley's external charms cannot be separated from his virtue.

In *Emma*, then, it is fair to say that appearance mirrors reality. Those who seem good, are; there is no need to question appearances... except, that is, the appearance provided by Frank Churchill and Jane Fairfax. In the novel's system of values, Frank and Jane commit quite a serious wrong when they hide their commitment to each other. Jane is quickly forgiven because of the circumstances of her poverty and related social vulnerability. Frank Churchill has to write a long letter apologizing for his concealment, which is read by most of the other major characters. Mr. Knightley, the novel's close-to-perfect man, is slowest to forgive.

These days, it may be hard for us to understand what is so wrong in simply concealing love. But Jane Austen is writing about a kind of existence in which nothing should be concealed because everything can—and should—be in order. ■

***Lesley Mackay**, who holds a B.A. from the College of William and Mary and an M.A. in English from Indiana University, is CTY's Staff Writer. **Amanda Claybaugh**, formerly a member of **Imagine**'s editorial staff, graduated from Yale and is now pursuing a Ph.D. in English at Harvard University.*

Keep up with our Fascinating Classics series to see if the ideal of an ordered, perfectable world is upheld by later novelists. For our November issue, read *Great Expectations*, by Charles Dickens.

THE INSIDE SCOOP *on Applying to Highly Selective Colleges*

by Janet Chien, Yale '94

While attending Yale, Janet Chien spent several years working in the Undergraduate Admissions Office. She was surprised to notice how many otherwise strong candidates lost their bid for admission because they neglected to follow certain simple guidelines in the application process. Now Janet draws on what she learned there—and during her own college application experience—to offer advice to her younger sister, Angela, and other high school seniors.

So you want to go to Yale or Harvard or MIT or Berkeley? You think you've got what it takes to get in? You know, you're probably right. You're bright, you've been recognized as being academically talented. Congratulations, you deserve all the commendations you've received and even those you've yet to receive.

Highly selective colleges are fighting for students like you. They want the best and the brightest. They want students from Long Island and students from Kalispell, Montana. They want musicians and athletes and journalists. They want you. But they do not necessarily know that, just yet. You may be the epitome of the Harvard Cantab or the Yale Bulldog or the Stanford Cardinal, but who knows that? You, your mom, your teachers—but not the folks who sit on the admissions committee, not the folks voting yes or no.

You may have the grades and the scores, the recommendations and the activities, but nobody is a shoo-in at any of these colleges. After applying to ten colleges myself and working at the Yale Undergraduate Admissions Office, I'm still not sure why I, in particular, got into Yale. But I'm a little more knowledgeable than I was four years ago. (I'm applying to med school now—I hope my experience helps.)

I bet you've been getting mail from colleges since you took the SATs in seventh grade, or at least since you took the PSATs in 10th or 11th grade. You've probably sorted the brochures into one stack to re-read and one stack to use as kindling.

To narrow down your choices, you must make some decisions. Do you know what you want, what you don't want? 50,000 or 500 students? Rural or urban? Private or public? Close to home or 3,000 miles away? Technical or liberal arts? These are all things you need to consider.

Also consider what a school has to offer outside academics. Are you a musician? An athlete? Are you interested in co-oping or volunteering in the community? Are you an actor or a journalist? These activities will play a large part in your college career and happiness, so they should play a large role in your choice of a college.

Before you fill out a single application, take time to do some research. You wouldn't walk into a car dealership and buy the first car you see without investigating its features and its ratings. How much does a car cost? Oh, $10,000-$30,000 for a standard family car. *College* can cost over $100,000. **So, do your research.**

Read the brochures, talk to people you know at these colleges, call the admissions offices, and ask questions. You can buy a book, but those big catalogues of "U.S. Colleges and Universities" aren't very helpful. One of the few insightful anthologies of colleges is the *Insider's Guide to Colleges*, put out by Yale University undergrads in conjunction with their friends at other colleges.

Now you've narrowed the field of 50 colleges down to a manageable 18 or 20. The stack of applications is sitting on your desk. Glossy covers—showing laughing students sitting under a maple tree turned brilliant reds and yellows in the October sunshine—serve to whet your appetite. Then you open the applications and see, say, 10 forms *per college*. Ok, so the second lesson is, **don't apply to too many colleges;** I think 8-10 is reasonable.

Different colleges have different items to be submitted at different times. Make yourself a chart, listing everything that must be sent, along with the submission deadline. Tack it up on the wall to serve as a daily reminder. Enter the date and check off each item as you send it off.

The details of each application are different, but there are some major themes.

1. General application. This is the easiest part—name, address, birthdate, high school address—you know, the stuff that you can't help.

2. Your transcript. *Very* important. Trust me, your GPA is not nearly as important as your detailed transcript. The admissions officers will scrutinize your transcript; they will look at what courses you've taken and compare them with the curriculum offered at your school. Challenge yourself: a *B+* in an honors or AP course is more impressive than an *A* in a regular course.

Make sure you take advantage of everything your school has to offer. However, if your school only offers classes through Trigonometry or Spanish III, by all means, don't panic! The officers know that not every school is Exeter or Stuyvesant. Don't worry because some high schools weight GPAs and some don't; most colleges recalculate GPAs according to their own method, usually eliminating classes like typing and P.E.

3. Standardized test scores. These seem to fall into two categories:

- **SATs/ACTs—aptitude tests.** These are nice, but as one admissions officer put it, they're one morning of your life. One Saturday morning. If you did well, that's great; if not, don't sweat it.
- **SAT II: Subject Tests/APs—tests of knowledge.** These are more reliable and therefore more important. Most colleges ask for three Subject Tests (formerly known as Achievements). You can take them early. The Math II doesn't require calculus, and none of them requires AP-level courses; so you can take them before senior year. (Which I didn't, and ended up taking standardized tests the first weekend of every month for something like four months—bummer of a social life for my senior year.) Take them right after you've finished a class; that way you won't have to expend extra energy reviewing.

4. Non-academic stuff. This usually is a list of activities and honors and leadership positions. Top colleges are looking for students who are involved and committed to what they do, students who show evidence of being able to get along with and lead their peers. Contrary to popular belief, the 1600-SAT, 4.0-GPA student is *not* the only one who gets into Harvard or Yale or Berkeley. Those scores don't hurt, but colleges are interested in you as a person.

Go to your computer and type up an organized list of your activities, listing the years you participated in them, leadership positions you held, a brief description of an obscure activity, and any honors won. Don't go too far back: freshman year in high school is a pretty good starting point. Feel free to include Talent Search awards, but don't mention that you were chosen the "Most Friendly and Helpful Student in Mrs. Brown's Homeroom" in fourth grade. The officers are not likely to be that interested. No offense to Mrs. Brown.

Most colleges give you about half a page to list activities and awards. This is not enough. So, type your most important and impressive ones on the page, and then type "See attached page(s)." Do this for every college; it can't hurt to let them have a nicely organized listing of your accomplishments. This list is what makes you different from the other 3,000 students applying to Harvard with great SATs and GPAs. Take it seriously. I still have mine around; it's been edited and updated, but it's still on my hard drive.

5. Recommendations. These are actually pretty important. Pick people who know you well both as a student and as a person. You should stay away from P.E. teachers, although you can ask your coach. Most colleges like to have recs from teachers of your heavy subjects: math, science, and English. But character references aren't a bad idea: your volunteer supervisor, your boss, your music teacher. However, your Uncle Joe doesn't count for much; neither does a form letter from your congressman or your favorite movie star.

Make sure you ask your teachers early enough for them to have time to think about you and to write a thoughtful recommendation.

6. Essays. Oh, no! Essays!! Most colleges have two essays, at least one of which is very open. This is your best chance to say something about yourself that perhaps your application doesn't show. Or you can use it to expand on one of the items on your activities/honors/ awards list. Or you can say something totally random. But make sure it is *you* speaking. Colleges are not looking for the polished writing of a 26-year-old Ph.D. student; they are looking for the honest, well-written, and clearly thought-out essay of a high school senior. Write about what interests you, not what you think *they* want to hear. Think about these essays for a while, but again, don't stress. They are just a part of the portfolio that is your application.

7. Financial Aid applications. These are usually due later, and you'll need your parents' help. Make sure you note the deadline.

On a side note, look for the *little* scholarships. Usually the library will have information about local scholarships. Every $500 makes a difference. Universities also offer scholarships; although a lot of private schools only offer need-based aid, state schools offer very attractive scholarship packages.

8. The interview. This is not a big deal. More likely than not, your interviewer will be an alum of the school and is not there to make you quake in your shoes. Relax and be frank. Interviews are an opportunity for you to tell the school a little more about yourself; also, feel free to ask your interviewer questions about the school. If they didn't love it, they wouldn't be interviewing and recruiting.

9. Visiting. Always a good idea. If you live far away, wait until you hear from colleges before spending dollars to visit. Many schools offer hosting, as well as a specially planned week for prospective freshmen. You will get information about these programs with your acceptance letters.

Visiting is the best way to get a flavor for the campus. Chat with the students, attend a few classes, talk with professors and coaches, check out the extracurriculars of your choice, and—as an added bonus—meet other students who may be your future classmates. (A friend of mine met the love of his life at a pre-frosh program.)

10. Miscellaneous. Type your applications. You may have copper-plate script or chicken-scratch handwriting, but after reading 15,000 applications, the officers will appreciate a neatly typed one. Make photocopies of *everything*, just to be safe. Consider enclosing self-addressed stamped postcards with your applications; ask the admissions officer to date, sign, and return the postcard when your application is received, for your own peace of mind.

Try to get things done on time. Fed Ex is convenient—NOT—and expensive—VERY! Applying to college can be a daunting task involving a lot of stress and paper pushing. Being organized cuts down on both the stress and the paper volume. Take your tests early, get your recommendation forms out early, start thinking about your essays early. You get the idea. Create a file folder for each school, make checklists, etc.

And good luck. Remember, not getting into your first-choice college is not the end of the world. Once you've sent those applications in, forget about them (until April) and enjoy your senior year. When all the decisions come down to you, consider visiting your options, bargain with the Financial Aid people, and waver back and forth for a month before making *your* decision. I certainly did.

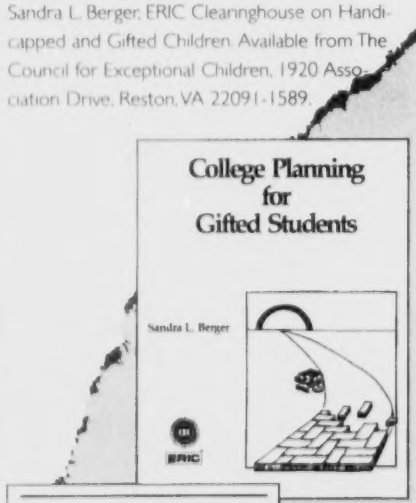
Over the summer, talk with your roommate(s). Coordinate what you are bringing; four stereos and no couch is bad; so is four couches and no stereo. Most colleges offer great prices for computers, so consider waiting until you have conferred with your roommates about the computer situation and until you arrive on campus to snag the best deal computer-wise.

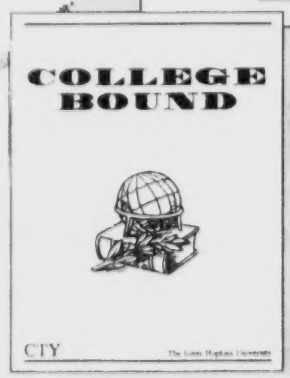
Hey, that's it. Go off to college and have the best four years of your life! ■

***Janet Chien** graduated from Yale last spring with a major in molecular biophysics and biochemistry. Before entering medical school, she is taking a year off to volunteer in a local hospital, travel to Taiwan to teach English, and help with a children's choir.*

RECOMMENDED READING:

College Planning for Gifted Students, 2nd edition, by Sandra L. Berger; ERIC Clearinghouse on Handicapped and Gifted Children. Available from The Council for Exceptional Children, 1920 Association Drive, Reston, VA 22091-1589.





College Bound. Center for Talented Youth. Available from CTY Publications & Resources, The Johns Hopkins University, Baltimore, MD 21218-9985; (410) 516-0245.

STUDENTS REVIEW PRINCETON UNIVERSITY

College Review Series

This on-going series is intended to aid prospective college students in their search by offering insiders' views of selected colleges and universities, as expressed by current undergraduates or recent graduates who have exceptionally high academic ability. These students share a general bias in judging undergraduate education: they all have high expectations for a college or university's academic standards, its institutional and instructional flexibility, and its respect for nurturance of emerging talent. In this issue, we focus on Princeton University.

Note that the number of student reviewers is small. Consider their personal perspectives as only one component while you gather factual information and impressions from such other sources as college catalogs, site visits, talks with officials and students on campus, and the advice of your guidance counselor and teachers.

Princeton University

Our reviewers include 29 students, who major(ed) in aerospace engineering (2), art history (1), chemistry (1), comparative literature (1), computer science (1), economics (3), electrical engineering (3), English (2), history (1), math (8), molecular biology (2), physics (4), and politics (1). (The number of majors exceeds 29 because one student had a double major.) Students' comments appear within quotation marks.

Quality of Academic Instruction for Undergraduates

Reviewers used superlatives in response to this question, praising the faculty for their excellence, accessibility, and dedication to undergraduate education.

*"'Superior' and 'the best' are two terms that come to mind. Princeton has **the** best undergraduate instruction **anywhere**. The teaching at Princeton is awesome."*

"The quality of instruction at Princeton is exceptional. The school stakes its name and reputation on undergraduate instruction because the graduate school is very small. Unlike other universities, Princeton's primary directive is with its undergraduates, not its graduate students."

*"Instruction is generally **outstanding**. Lectures are fast-paced, insightful, and often entertaining, while weekly preceptorials (discussion sections) allow one to go over material in a more casual small group setting. Warning: as I learned all too painfully, math and physics at Princeton are **very** intense. The workload in those classes is approximately twice that in other subjects."*

"Princeton offers the highest quality of education that I can imagine. Classes are almost universally very intellectually stimulating and challenging. The Economics Department, one of the larger, and more bureaucracy-laden, doesn't offer many small classes with a high degree of personal interaction; but I have gotten to know two profs quite well while working under their tutelage on my two Junior Papers. The library is amazing, and the computer facilities are quite adequate."

*"The senior professors could not be more accessible. They **reach out** to the students in an openness that is far beyond the call of duty. The atmosphere is one of **giving**. The professors at Princeton have been my philosophers, guides, and friends. I cannot sufficiently express my gratitude to Princeton."*

"Professors care about teaching and are always willing to talk things over outside class. You can tell they love their material and want you to love it too. You can't resist an atmosphere like that!"

"Despite the inevitable occasional disappointment, Princeton lives up to and possibly surpasses its reputation for outstanding undergraduate education. Math and science classes provide even the country's brightest students with challenging classes."

"The physics department gives incredible amounts of attention to undergraduate students. I once spent six hours straight in a one-on-one talk with a professor. The math department, on the other hand, appears to have a faculty notably lacking in interpersonal abilities—but then, that may be true of many math departments!"

"There's no core curriculum, and nearly any course satisfies one of the distribution requirements. Consequently it is easy and enjoyable to fill these requirements. My only complaint is that there is not enough time to take all the courses I'll like to take!"

"Grading is tough—much tougher than grading I've experienced while taking courses at Cornell and Penn. I have to work hard to get a good grade."

Social Life

For the first two years, students live and eat in one of five residential colleges. In the last two years, many students join and live in "eating clubs," which are the heart of Princeton's social life. Prospective members "bicker" for admission (a process somewhat like rush) to five of the eating clubs, and sign up for the other eight clubs on a first-come basis. Most of the assessments of the social life were quite favorable.

"For over 100 years, a unique system of eating clubs has been central to Princeton's social life. Most juniors and seniors join one of the eating clubs, which are like fraternities but nicer. Most partying occurs at the eating clubs. Those who don't party get together with friends or go to NYC or Philadelphia. Lots of other clubs and activities round out the social life and make it impossible to be bored."

"The town of Princeton is very small and conservative, so the entire life of the university is confined to the campus and the eating clubs. There is really no nightlife in town. That said, there is always plenty to do on campus and weekend activities to fit every taste—theater, dance, and improv groups on campus, as well as a nationally known theater just off-campus."

"Princeton is a blast. The environment is conducive to both social and intellectual growth. At Princeton, a student can experiment with every facet of life in a safe, healthy environment."

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"Social life is horrendous! People primarily go out only on Thursday and Saturday nights from midnight to 3:30 am!"

"The moments were not few in which my roommate and I found ourselves stupidly confounded by the question, 'What do you want to do tonight?' The stores and cafes on campus or on Nassau Street all close around midnight, which is bothersome when that's when you finally finish enough work to deserve a study break. A small college-town does limit your options. But despite such occasional moments of despair, I was content. Someone is always there with a sympathetic ear, or thinking up something crazy to do."

What Do You Like Best About Princeton?

Reviewers cited the education, the gorgeous campus, and an intellectual and social environment that fosters the best in many students.

"Princeton is a very challenging environment academically and socially—you rise to your own potential."

"The camaraderie of my fellow students, who provided a high-caliber social and athletic setting without sacrificing the quality of the academic (or informal intellectual) environment."

"It has an excellent combination of strong math/science/engineering programs and outstanding liberal arts programs. Academic standards are very high, but competition is not cutthroat. The environment is very supportive."

"Princeton has given me the opportunity to develop in non-academic ways, like leadership and social skills. I think that I've gained much that I might not have developed at another school."

"The feeling that I am an integral part of Princeton's fervent intellectual life. To be able to look at the beautiful campus and say, 'I belong here.'"

"I don't know how to describe it, but I love the sense of community. I have made so many wonderful friends here. I also love the flexibility available to students. With two Junior Papers and a senior thesis, individual interests may be explored and clarified. And the faculty is very supportive of the students' research. I just love Princeton, and I know I will always look back on it with pride."

What Do You Like Least About Princeton?

A few respondents found the workload oppressive, while others noted that it can be hard for non-traditional Princeton types to find their niche.

"I am always too busy to take advantage of everything that is available—great speakers, performances, activities."

"The workload, as far as I'm concerned, is often unbearable. I really crack under pressure, and several times I just didn't know how I would make it through a semester."

"The degree of conservatism, uniformity, and the continuous studying are killing me!"

Princeton University

Princeton, NJ 08544
(609) 258-3060

- 4-year private coed university
- Campus in a small town
- Semester system
- Full-time undergraduate enrollment 1993-94: 2,569 men; 1,969 women
- Special features: the "Gothic kingdom of a campus" (as one guide to colleges describes it), Firestone Library, Woodrow Wilson School of Public and International Affairs, and the nation's oldest debating society

"If you don't fit the Princeton stereotype (upper-class, white, heterosexual, on the conservative side), you can spend a lot of time searching for people to connect with. Even just being female at Princeton can be difficult. If you want to change things, it can be even more difficult—I often felt that the only way I could change things would be to become an extremely rich alumna."

"Tough question. My least favorite part is probably the completely undeserved reputation Princeton has for being elitist, wealthy, and homogeneous. It's simply wrong."

Who Would Be Most Compatible with the Academic and Social Atmosphere at Princeton?

"There's no typical Princetonian. However, it's crucial to be self-motivated because independent research is heavily emphasized."

"Someone who is self-motivated and is going to get what they want. To get the most out of Princeton, you have to be willing to go talk to professors, do good independent work, and take advantage of the opportunities available."

"Someone who is fairly independent and enjoys a fairly small but by no means limiting community."

"Most Princeton students have a wide variety of academic interests and are generally very social and athletic. I wouldn't recommend Princeton to someone who wants to focus only on one particular pursuit."

If You Had It To Do Over Again, Would You Go To Princeton?

All but three respondents gave very enthusiastic affirmative responses. Of those three, two weren't sure, and one answered no.

"Yes, yes, a thousand times yes!"

"Yes. It's very challenging. I don't think any place else combines the quality of the professors, students, and facilities with the opportunities and accessibility of the faculty."

"My Princeton experience has been an amazing one. I have grown in ways that were unimaginable to me when I started college. I don't think there's a better place to be an undergraduate."

"No. I attended a very white, WASPy high school, and I feel like Princeton is the same place all over again."

As you try to find the college or university best suited to you, the views of Princeton presented above may be helpful. Keep in mind that these students might have had similar positive or negative experiences had they attended a different university. At any college, it is important for the individual student to seek out challenging academic experiences and the best professors, and to create a social life that best fits his or her personal style. ■

Note: The students quoted in the College Review Series are expressing their own views, which are not necessarily those of JHU or CTY.

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CREATIVE MINDS ImaGiNe...

Submit your creative work—brain teasers, short stories/essays/book reviews. We look forward to hearing from you. Please write to *Imagine* • SET at CTY • The Johns Hopkins University • Baltimore, MD 21218

BRAIN TEASER

by Alejandro Jenkins

After completing his survey, a pollster found out that some of those he had interviewed had lied to conceal their true opinions. (It is interesting to remark how annoying it would be if people in real life answered the way they do in puzzles like this one.) He interrogated the four and got these responses:

Wise man: "If and only if I lied to you last time, the lady will lie now. If and only if I didn't lie the first time, she will be truthful now."

Lady: "I was truthful last time, when you asked me about my opinion."

Old man: "The wise man is lying now."

Boy: "Both the lady and the wise man are untruthful now."

Dog: "Arf-arf!"

A reliable psychic told the pollster: "There were two liars on the first occasion. Those who had lied before are lying now. Of those who had told the truth before, at most one is lying now; that could be either the lady or the old man. The dog's statement can be ignored, as it is impossible to determine what, if anything, he intended to communicate."

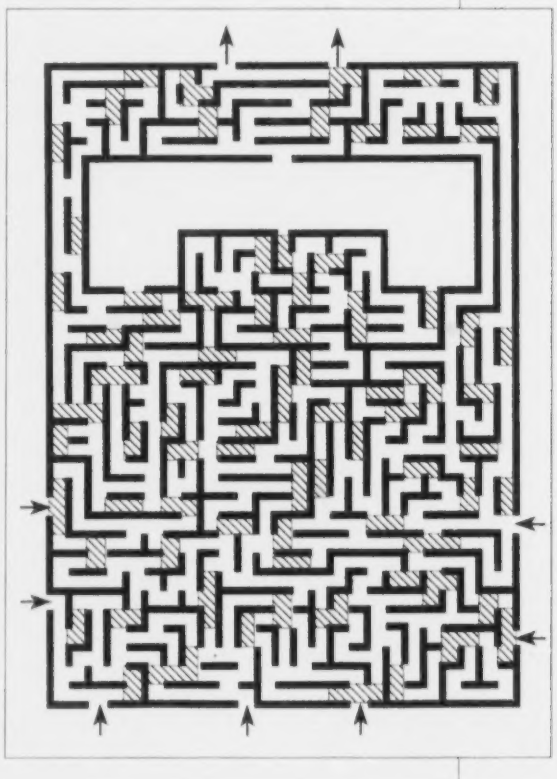
From this information, decide which two individuals lied the first time.

Alejandro Jenkins enjoys academic competitions and studies oil painting, piano, and French outside school. He lives in Costa Rica, where he attends the bilingual Lincoln School.

ANOTHER PUZZLE

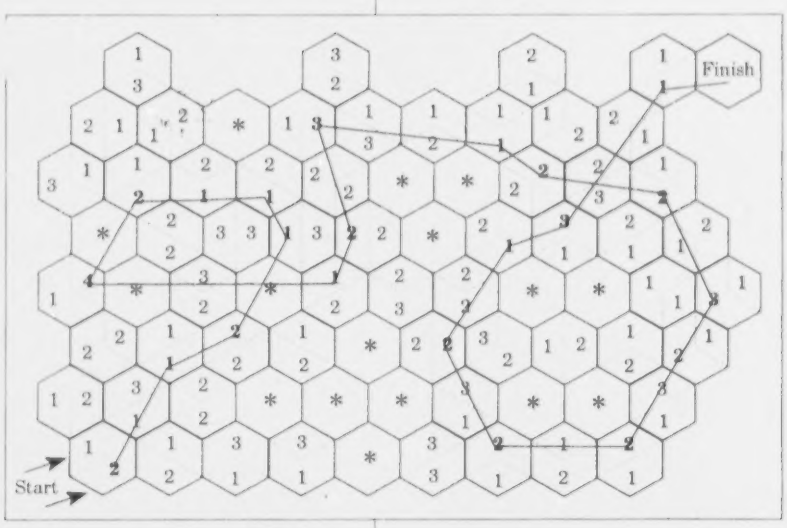
by Tim Boester

Fascinated by mazes and puzzles, **Tim Boester** is also intrigued by roller coaster design. Tim has entered the University of Chicago, where he plans to study physics and math.



Directions:
Enter the maze at one of the "in" arrows and leave at one of the "out" arrows. You may cross only five of the striped rectangles.

Solution to Puzzle in May/June issue of *Imagine*:



VOLUME 2 • NUMBER 2

Opportunities and Resources for Academically Talented Youth

Spotlight On

THE HUMANITIES

Photo by Maria Stenzel for the National Geographic Society

To win the National Geography Bee in 1990, Susannah Batko-Yovino immersed herself in that broadly-based humanities subject (page 6)

November/December 1994

Mailbag **2**

Humanities Competitions: Peer-Supported Learning in an Exciting Atmosphere **3**

National Geography Bee **6**

On Public Speaking, Elementary Style **7**

In the Balance: Reconciling Feminist and Multicultural Awareness with Academic Programming in Schools **9**

A Creative Writing Career—Can You Get There from Here? **12**

Fascinating Classics: Great Expectations **14**

More about the International Baccalaureate **16**

The Coach's Corner **17**

Students Review The University of Michigan **18**

Creative Minds Imagine **20**

The humanities—that vast array of research, knowledge, and speculation that concerns human beings and their culture—offer a veritable feast for the inquisitive mind. To explore the humanities is to learn more about ourselves, about the realms of reason and faith, and about the nature of our relationships with one another, locally and globally.

Educated members of any society need to be well grounded in the humanities, to have a basic understanding of history, geography, language, literature, philosophy, the creative and performing arts—essential aspects of a culture that shape its fundamental nature. In gathering such understanding, we struggle to make sense of the world and our place in it.

A standard curriculum includes courses in some of these elements, but many of you hunger for more than you are offered in school. So how do you satisfy this yearning?

As an academically talented student, you know that learning is not confined to the classroom. Your intellectual curiosity feeds on any experience that enables and enhances learning, that stimulates the development of your creative, imaginative life. To explore the humanities outside school, you can choose from a vast menu…books to read, extracurricular activities to engage in, summer programs and supplemental courses to take, travel opportunities to expand your horizons. And the number of academic competitions available in the humanities may surprise you if you've been more aware of those in math and science.

In this issue of *Imagine*, we describe just a few of the options available to students interested in expanding their knowledge in the humanities. Future issues will offer more ideas. Meanwhile, we hope this sampling will whet your appetite. ■

Printed on recycled paper.

MAILBAG

I just took the PSAT and am hoping to win a Merit Scholarship. What can you tell me about the different kinds of scholarships offered and my chances for getting one?

By taking the PSAT/NMSQT as an 11th grader in October, you have joined the ranks of more than one million high school students in the Merit Program competition for 1996. This December, your school will give you a report that shows your math and verbal scores and your Selection Index score, which is computed by adding twice your verbal score to your math score (2V + M). The *Selection Index* is used as the first screen to weed out some students from the large number of competition participants.

Next April, you will be notified if you are among the 50,000 or so students with the highest scores nationally. In September 1995, when you are a high school senior, you will learn whether you are among the Commended Students or Semifinalists.

About 35,000 of the 50,000 highest scorers will be recognized as **Commended Students** based on their Selection Index score ranked against others *nationally*—usually above the 95th percentile for other college-bound juniors taking the PSAT/NMSQT. Commended Students do not continue in the competition.

If you are among the remaining 15,000 students named at this time as **Semifinalists**, you will have qualified based on a comparison of your Selection Index score with those of others *within your own state*. Cutoff scores at this level are extremely high, although they do vary from state to state and from year to year. Less than half of one percent of any state's graduating seniors become Semifinalists.

So far you have climbed the Merit Scholarship ladder based on your performance on the PSAT/NMSQT. However, the next rung—Finalist status—will require additional effort on your part. At this point, you will be asked to submit additional materials, including your high school records, a principal's recommendation, and a scholarship application including information about your interests and accomplishments. If you are interested in receiving a College-sponsored Merit Scholarship (see below), you should indicate your interest in a sponsoring institution on this application. If you name only colleges that are not sponsors, you will not be considered for one of these scholarships. You must also take the SAT I and earn scores that are comparable to those on your PSAT/NMSQT.

In February 1996, about 14,000 of the 15,000 Semifinalists will become **Finalists**. Eventually, about 6,500 of these Finalists will receive a Merit Scholarship in one of three categories:

- ***Corporate-sponsored Merit Scholarships***
  Beginning in March 1996, about 1,200 Finalists will be offered one of these awards. The award criteria and amount are set by the sponsoring companies. You have a better chance of receiving one of these scholarships if one of your parents works for a sponsor, if a sponsor has offices in your community, or if you are planning to pursue a career that is of particular interest to a sponsor.
- ***National Merit Scholarships***
  Also in March 1996, about 2,000 Finalists will learn that they have won these single-payment awards of $2,000, which are the only Merit Scholarships correctly designated as "National." You would be competing against other students in your state for this award.
- ***College-sponsored Merit Scholarships***
  In April 1996, about 3,300 Finalists will receive these awards from granting colleges and universities, which determine their value. Stipends range from $250 to $2,000 per year and may be renewed at the college's discretion for up to four years. Not all colleges offer Merit Scholarships, and those that do require you to indicate their campus as your first choice. These are the only non-transferable Merit Scholarships.

For the most complete information on the Merit Scholarship Program, pick up a copy of the PSAT/NMSQT *Student Bulletin* from your high school guidance office. Note the full listing of all institutions that offer NMSC Corporate-sponsored and College-sponsored Merit Scholarships. The *Student Bulletin* also includes information on other NMSC programs, such as the National Achievement Scholarship Program for academically able high school students who are Black Americans.

ASPIRING SCIENTISTS, TAKE NOTE

Remember the approaching deadlines for these two science competitions:

- Twelfth graders must submit project entries for the ***Westinghouse Science Talent Search*** by **December 1, 1994**, to Science Service, Inc., 1719 N Street, NW, Washington, DC 20036.
- The entry deadline is **January 13, 1995**, for student inventors in grades 9-12 who have designed and built a Duracell-powered device for the Duracell Flash NSTA Scholarship Competition. Submissions go to the National Science Teachers Association, 1840 Wilson Boulevard, Arlington, VA 22201; (703) 312-9260.

Imagine...
*Opportunities and Resources for Academically Talented Youth**

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SET Director • Linda E. Brody, Ed.D.
Research Associate • Carol C. Blackburn, Ph.D.
Staff Writer/Editor • Susan B. Hellerman
Staff Writer • Lesley Mackay
Administrative Assistant • Patricia A. Wade
Designer, JHU Press • Lesli M. Lai

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The Johns Hopkins University Press
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Address editorial correspondence to:
Susan B. Hellerman
SET at CTY
The Johns Hopkins University
Baltimore, Maryland 21218
Phone: (410) 516-0309 • FAX: (410) 516-0108
E-mail: setcty@jhunix.hcf.jhu.edu

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Humanities Competitions

Peer-Supported Learning in an Exciting Atmosphere

One aim of academic competitions is to foster an interest in learning as an exercise in critical thinking, rather than rote memorization. Contests celebrate intellectual excellence and accomplishment, so they are a valuable antidote to situations where students may be taunted for being "too smart." Such negativity finds no place in the competitive environment.

Although a few contests—most notably, the National Geography Bee and the Westinghouse Science Talent Search—do award significant scholarships to top scorers, prize winning is not the primary motivation for entering most academic competitions. Participants simply enjoy the thrill that comes from pursuing an intellectual challenge and matching wits with their peers. And this competitive spirit is engaging, helping to transmit the message to others that dedication to scholarship, like dedication to athletic prowess, can be worthwhile and enjoyable.

Humanities Competitions

Like the mathematics contests described in our last issue, academic competitions in the humanities come in three basic formats:

- ***One-time individual exams*** administered by the school and graded by the national sponsor. This format is used primarily in foreign language competitions (which will be covered in our May/June 1995 issue).
- ***Contests by mail,*** such as those in writing and art, where you submit your own creative work independently, with or without the guidance of a mentor.
- ***Team challenges,*** in which you work cooperatively with a group of other students to compete against teams across the country, either from your school base (by computer or mail) or by traveling to a central site.

As you read through the following descriptions, you'll notice a tremendous variety of competition styles even within the three basic formats. Take note of those that appeal to you, then request more complete information from the sponsors. You'll want to confirm the cost and process of registration and any requirements for involving a mentor/teacher supervisor.

Of course, participating in an academic competition of any kind requires in-depth study and intensive preparation outside the standard middle or high school curriculum. And that can be part of the fun. You may organize study groups by pulling together other highly motivated students who are interested in this activity. And sponsors will provide contest guidelines and copies of previous years' questions to guide your group in its practice sessions.

Don't overlook the possible benefits of group preparation even if your particular interest is in a writing or art contest which you will enter individually. You may still strengthen your chances for success by getting together with other creative individuals for group critiques.

With the wide variety of format options and subjects available in humanities competitions, you're sure to find one or more that seem just right for you. Go ahead: try them out. Then let us hear about your experiences, so we can pass your recommendations on to others. We'd especially appreciate learning about worthwhile competitions that haven't been mentioned in *Imagine*.

Remember that the few competitions we've chosen to include here represent only a hint of your options in the humanities. For more possibilities, check out:

- ***Freed's Guide to Student Contests and Publishing*** (5th edition), by Judith M. Freed ($13.95). Available from Fountainpen Press, 218 West Fountain Avenue, Delaware, OH 43015-1565; (614) 369-4306.
- ***NASSP National Advisory List of Contests and Activities*** (#2109495; $5.00). Available from the National Association of Secondary School Principals, 1904 Association Drive, Reston, VA 22091-1537; (800) 253-7746.

There's still time to register for these 1994–95 competitions!

Future Problem Solving Program
(multiple teams per school)
Grades 7-12 *(also Primary Division for younger students)*

For two practice rounds and one qualifying round, participating schools receive a description of a "fuzzy situation" in a future scenario. Four-member teams define their "best solutions" through a process that highlights critical thinking and communication skills, research, creativity, and teamwork. Completed problems are sent to the FPSP International Office, and teams receive written evaluations.

Those with the best performance on the qualifying problem are invited to regional and state competitions leading up to the FPSP International Conference, held in June at the University of Michigan in Ann Arbor.

The FPSP topics for 1994-95 are "Cities" and "Homelessness" (practice rounds); "Kids and Violence" (qualifying round); and "Privacy" (International Conference).

Although the deadline for practice round #1 has passed, teams may still enter for practice round #2 and the qualifying round. They simply lose the advantage of receiving feedback on the first round.

Next deadlines: January and March 1995
Future Problem Solving Program, 318 West Ann Street, Ann Arbor, MI 48104-1337; (313) 998-7377.

FPSP also sponsors these two programs for students in grades 4-12:

- Community Problem Solving Program—Teams composed of any number of students identify a currently existing, real-life problem, then design and implement a solution. **Project deadline: April 7, 1995**
- Scenario Writing Program—Individual students create 1,500-word (maximum) short stories set at least 20 years in the future and related to one of the FPSP topics for the year.

Competitive round deadline: February 24, 1995
Future Problem Solving Program, 318 West Ann Street, Ann Arbor, MI 48104-1337; (313) 998-7377.

Knowledge Master Open *(one team per school)*
Grades 5-12

Seeking to make academics a "participatory sport," KMO uses computers to hold national academic meets among teams located in classrooms across the country. Each school's team may be composed of any number of students. KMO provides specially-programmed Apple II, IBM, or Macintosh computer disks containing two hundred questions, to be answered during one uninterrupted session of two to three hours. The questions focus on concepts, skills, and knowledge in 15 curriculum areas. Teamwork and scholarship are essential to success; points are awarded for speed and accuracy.

The twice-yearly KMO takes place in fall and spring for grades 7-12 and in winter and spring for grades 5-6.

Registration deadlines: November 23, 1994, & April 19, 1995 (grades 7-12); January 13, 1995, & March 10, 1995 (grades 5-6).

Academic Hallmarks, Box 998, Durango, CO 81302; (800) 321-9218.

National Peace Essay Contest *(mail, individual)*
Grades 9-12

The United States Institute of Peace, created by Congress in 1984, sponsors this annual contest to help promote public education and discourse on the complexities of international conflict and peacemaking.

An adult in the community acts as a contest coordinator for local participants, reviewing essays and providing a liaison between students and the Institute. Following the established guidelines, each student submits an essay of less than 1,500 words, along with a bibliography or endnotes of sources reviewed in answering the assigned question which focuses on current events.

Contest winners receive scholarships and an all-expenses-paid trip to Washington, D.C., for several days of simulation exercises, cultural events, and visits with experts and regional officials.

Postmark deadline: January 23, 1995

United States Institute of Peace, 1550 M Street, NW, Suite 700, Washington, DC 20005-1708; (202) 429-3846.

National Academic Team Challenge
(multiple teams per school)
Grades 9-12

Among the six NATC academic competitions, the two in the humanities—English and history—are scheduled to be held at participating schools in February 1995. For these two exams, three-member teams tackle problems with varying degrees of difficulty, including subject material in Advanced Placement courses. The focus is on team cooperation, thoughtful analysis, and understanding of concepts.

Top team scores from each school are entered into a national database for competition against participating schools across the country.

Registration deadline for NATC humanities exams: December 16, 1994

Clayton T. Cowl, M.D., President, Foundation for Scholastic Advancement, P.O. Box 3340, Iowa City, IA 52244; (312) 464-4812.

National Written and Illustrated By... Awards Contest for Students
(mail, individual)
Age categories: 6-9 years, 10-13 years, 14-19 years

Landmark Editions sponsors this annual competition in which entrants submit a book of 16-24 pages that they have written and illustrated themselves. One winner in each category receives a publishing contract and royalties on the sale of his/her book. (See the article on p. 7 by Steven Shepard, who won this contest in 1992.)

Entry deadline: May 1, 1995

National Written and Illustrated By...Contest, Landmark Editions, P.O. Box 4469, Kansas City, MO 64127; (816) 241-4919.

Quill & Scroll Society International Writing and Photography Contest
(mail, individual)
Grades 7-12

Separate divisions for junior and senior high students include categories in editorial, cartoon, news story, feature story, sports, photography, and others. Entries must have been published since last year's deadline in a school, local, or national newspaper.

Entry deadline: February 5, 1995

School of Journalism, University of Iowa, Iowa City, IA 52242; (319) 335-5795.

National Federation of Press Women High School Journalism Contest *(mail, individual)*
Grades 9-12

Students may submit entries published since last year's deadline that fall into the following categories: editorial, feature, news, sports, personal column, feature photo, cartooning, and graphics. First place winners from each state advance to national competition. Call for the NFPW office in your state.

Entry deadline: February 20, 1995

NFPW Headquarters Office, P.O. Box 99, Blue Springs, MO 64013; (816) 229-1666.

National Council of Teachers of English Achievement Awards in Writing
(mail, individual)

Teachers are invited to nominate U.S. and Canadian students currently in **grade 11** who demonstrate the ability to use the English language to inform and move an audience. Nominees then submit two writing samples, including one timed impromptu essay on the year's designated topic. Writing entries are due in April.

Nomination deadline: January 23, 1995

NCTE Achievement Awards in Writing, 1111 W. Kenyon Road, Urbana, IL 61801-1096.

Texaco Star National Academic Championship *(team travel)*
Grades 9-12

To be eligible to attend this national-level event, teams must already have won a regional or state academic competition involving at least 16 schools.

Each team contingent includes four starters, two alternates, and one or two coaches (at least one of which must be a school employee). During the week-long event in June, food and lodging are provided at the competition site while teams go through elimination rounds. Points are earned for quick and accurate recall of information in current events, history, geography, music, art, algebra, trigonometry, and physics. The advanced round matches are taped and televised during the summer, primarily on PBS affiliates.

Because space is limited, teams are advised to register as soon as they are sure they want to participate. (At press deadline, this year's site had not been confirmed; the event has been held at Rice University for the past five years.)

Registration deadline: May 1, 1995

Chip Beall, Executive Director, National Academic Association, 8334 Breckenridge Way, Columbus, OH 43235; (614) 848-5113.

MARK YOUR CALENDAR

The 1994-95 registration deadline has already passed for these two competitions, so you've time to consider them for next year.

National Geography Bee *(individual)*
Grades 4-8

See Susannah Batko-Yovino's article on the National Geography Bee, pp. 6-7.

School principals must register. Dates for the 1994-95 Bees: Schools, December 5-January 13; Qualifying exam, January 31; State level, April 7; Nationals, May 30-31.

Next registration deadline: October 15, 1995

National Geographic Society, 1145 17th Street, NW, Washington, DC 20036; (202) 828-6659

United States Academic Decathlon *(one team per school)*
Grades 9-12

Over thirty thousand students compete annually in USAD's ten events. Striving to make high school learning an enjoyable, peer-supported activity, USAD involves nine-member teams composed of a mix of A, B, and C level students. All members compete in all ten events against others in their category.

The academic events include language and literature, economics, fine arts, social science, and history, in addition to math and science. Also, each competitor must give a speech, write an essay, and participate in an interview.

Registered schools receive a study guide defining the areas of knowledge that will be tested in each category. USAD recommends that students prepare by using standard advanced high school textbooks and current periodicals, and assigns additional resources—including original documents—for the history topic.

Call for information on how to reach your state coordinator.

Registration deadline: Early fall; varies by state.

United States Academic Decathlon, 11145 183rd Street, P.O. Box 5169, Cerritos, CA 90701-5169; (310) 809-4995, fax (310) 809-4111.

HUMANITIES BY MAIL

Duke TIP's Learn On Your Own Program

The Duke University Talent Identification Program provides texts, supplemental materials, and instructional tapes in a variety of subjects, including these in the humanities: Reflective Writing, English Language Use and Origin, Latin I-A and I-B.

Participating students, who must be highly motivated self-starters, must find a mentor who has expertise in the subject they've chosen and will agree to work with them throughout the course. Completed homework assignments are sent to Duke TIP for grading. This program is self-paced; if the student completes one lesson per week, each course takes one academic semester.

Registration deadline: Open enrollment

Duke University Talent Identification Program, P.O. Box 40077, Durham, NC 27706-0077; (919) 684-3847.

Merlyn's Pen Mentors in Writing Program
Grades 6-12

Through this twelve-week program, professional writers and editors from the Merlyn's Pen staff offer personalized, one-on-one writing tutorials in fiction, poetry, and nonfiction. Student writers learn by doing, through assignments and follow-up critiques that provide the essential structure of day-to-day practice in writing and rewriting.

This program is offered three times a year, during summer, fall, and spring semesters. Admission is not dependent upon academic requirements or test scores; applicants are asked to evaluate their own writing skills and define the areas in which they want to improve.

Next deadline: February 1, 1995.

Merlyn's Pen, P.O. Box 1058, East Greenwich, RI 02818-0964; (800) 247-2027.

Letter-Links Learning Program
Grades 6-12

Northwestern University's Center for Talent Development (CTD) offers a variety of correspondence courses in the humanities, including:

- Honors level courses in Latin I and II, Literary Analysis, Creative Writing, Psychology, Introduction to Philosophy, Futuristics, and Geography.
- Advanced Placement courses in Economics, Language & Composition, European History, and French.

Eligibility is based on SAT/ACT scores; participants must have strong independent study skills. Assignments require a minimum of 4-6 hours a week and are graded by experienced instructors. The next sequence of courses will begin March 1 and June 1, 1995, and will run for about eight months.

Registration deadlines: February 15 and May 15, 1995

Center for Talent Development, 617 Dartmouth Place, Evanston, IL 60208; (708) 491-3782, fax (708) 467-4283.

INTERESTED FOR NEXT YEAR?

Expository Writing Tutorial and Young Students Writing Tutorial
Grades 8 and above (EWT); grades 6-7 (YWT)

The JHU Center for Talented Youth offers two writing tutorial programs that link verbally talented students with professional writers who have teaching experience. Participants qualify on SAT-V and TSWE scores, and the tutor then assesses each student's needs based upon essays submitted with the application. Assignments—requiring 3-5 hours per week—and critiques are exchanged by mail every 10 to 14 days throughout the school year. The student receives a detailed evaluation at the end of the course.

EWT/YWT brochures will be available June 1.

Application deadline: September 2, 1995

EWT/YWT, Center for Talented Youth, The Johns Hopkins University, 3400 No. Charles Street, Baltimore, MD 21044; (410) 516-0161; fax (410) 516-0804.

National Geography Bee

by Susannah Batko-Yovino

At age 11, Susannah Batko-Yovino was the youngest student, and the only girl, ever to win the National Geography Bee. Four years later, she recalls that exciting experience—and some of its unanticipated results.

The National Geography Bee, sponsored by the National Geographic Society, is one of the most popular academic competitions in America. Fourth through eighth graders (last year, almost eight million) compete for the first-place prize: a $25,000 college scholarship. The next two finishers don't do too badly, either: a second-place $15,000 scholarship and a third-place $10,000 scholarship. The top ten national finalists each receive $500 cash.

The three-level competition begins in December or January at each registered school, where elimination rounds identify one student who may take the state qualifying exam. The top one hundred scorers on this test advance to the late-March/early-April state competition, where a morning elimination round determines ten finalists who compete in the afternoon state championship round. Then fifty-seven finalists—one from each of the fifty states, District of Columbia, U.S. territories, and the Department of Defense schools—go to Washington in late May.

On the first day of the national competition, the students are divided into five rooms with about ten people in each. After oral and written rounds, two finalists from each room advance to the national finals, held on the second day. Then the championship rounds determine the Bee winner.

Although the questions naturally increase in difficulty, they cover the same general areas of geography throughout all levels of the Bee: environmental issues; social, physical, economic, and cultural geography; and map-reading and interpretation, among others.

Preparing for the Nationals

After winning at the state level in Pennsylvania, I had two months to get ready for the national Bee. Because I needed to learn more about the wide range of geographical topics, I tried to study at least an hour a day. I used fact and quiz books, atlases, and geography games, and added general knowledge by reading newspapers, magazines, and periodicals. This was hard work but not really a chore, because I've always been interested in geography and enjoyed learning about the world.

By May 22, when we left for Washington, D.C., I had begun to feel anxious. During the preliminary rounds the next morning, I had a perfect score, but there was one tense moment. A slide depicted grain elevators painted with brightly colored advertisements, and the question was, "What is the purpose of these structures in Alberta, Canada?" My answer: "Advertising." The room got very quiet when my answer was not acknowledged as right or wrong. People started to laugh, but I looked around, confused. The judge said, "Your answer is correct, but it isn't in the answers provided. Can you give another answer?" I then said, "Grain storage." "OK," the judge said. "You can sit down." I sighed with relief. (I found out later that my creative answer impressed them.)

That evening, the National Geographic Society treated the competitors, their families, and their teachers to a barbecue in Virginia. The Bee organizers did everything to help us relax and let us know how much we had accomplished just by getting to the nationals. I had so much fun that night, I forgot about the finals.

Finally, the Finals

The next day, my parents and I went to breakfast early and walked to the National Geographic Society auditorium. Before the competition started, Alex Trebek, the host of the Bee (and of *Jeopardy!*), chatted with all the competitors. He asked me what I was holding in my hand, and I told him it was my St. Susannah medal—a good luck charm. (One of many. That made headlines after I won.)

The hardest question I had to answer was, "On what river is the Iguazu Dam located?" I'm still not sure how I came up with the answer: the Parana River. But it was more a combination of problem solving and general knowledge than something I studied. When you think of it, how would anyone ever expect that to be a question?

The Bee went on—and on—through agricultural products and land forms, the environment and Soviet republics, culture and climate. One by one, everyone was eliminated except a boy from New York and me. At that point, the slate was wiped clean and the championship rounds began. After an unbearably long three rounds, the question was asked, "On what continent is Mount Erebus located?" The other finalist answered, "Africa"; I answered, "Antarctica." And then I heard,

"Susannah Batko-Yovino, you are the 1990 National Geography Bee winner!"

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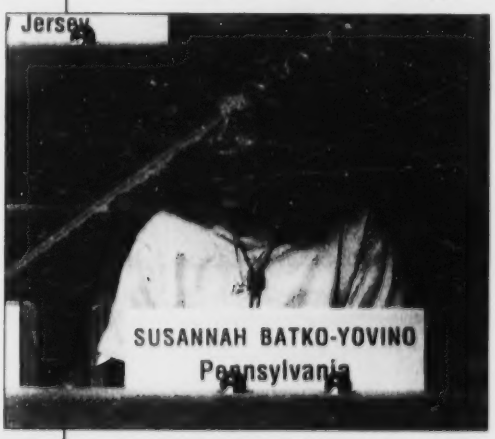

Photo by Maria Stenzel for the National Geographic Society

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On Public Speaking, Elementary Style

by Steven Shepard

Faithful readers of Imagine *will remember Steven Shepard as the author of two articles on "Writing for Publication," which appeared in our November/December '93 and January/February '94 issues. Since his book,* Fogbound, *was published last year by Landmark Editions, he has been much in demand as a speaker to elementary school children, an activity that takes him out of school about one day every other week.*

"Hi, guys," I greet my audience cheerfully. "My name is Steven Shepard. I'm fifteen years old."

They think I'm ancient, but to the librarian behind the shelves, I'm just a kid. I am standing, arms spread and feet planted, before sixty second graders in an elementary school library. Behind me is a table covered with props I'll use in the next hour.

After my quick introduction I start to walk, speaking slowly and watching a little boy watch me with his mouth agape. I tell him that kids his age and even younger can write and illustrate books, all by themselves.

He starts to pick his nose.

I eagerly search out another face in the crowd, a girl this time. Squatting down, I tell her that I wrote and illustrated a book when I wasn't much older than she is. I pluck a copy of *Fogbound* off the table and hold it up.

Fogbound is the reason I'm not in high school today. Elementary schools bring in speakers to talk about everything from African dances to the state zoo, and I am brought in as proof that kids can write. The librarian at this school is hoping I can convince some of the few hundred kids I talk to today that writing and reading aren't so bad, after all.

As I finish up a quick summary of my book, I hardly have to think about the words I'm saying or even the gestures and inflections that accompany them. I've given this presentation more than a hundred times, so the basics have become automatic. It's a little like learning to pitch. At first the mechanics of the wind-up take intense concentration, but with time they become habit, so a pitcher can think about where and what to throw.

And planning what to say took a lot of thought when I first prepared my presentation. I would have an hour with each group of kids. What ideas should I leave with them?

My mother, who teaches fifth grade, offered a little advice. "Tell 'em 'Show, don't tell!'" she suggested. "They never stop *telling*. And then tell 'em they've got to do lots of drafts! Oh, and then tell 'em…" and so on.

Now, a year later, I know exactly what I will say.

I plop down in a chair and say that stories are often better when authors use showing instead of telling. On this particular day, their expressions tell me that I might as well have commented on the proper seasoning for roasted iguana.

"For example," I continue, "imagine you're writing a story about a character, let's call him …Frederick. And Frederick becomes very bored." How, I ask, could they let their readers know that Frederick was bored? Well, they could just *tell* it: Frederick was bored. But that's pretty boring to read. On the other hand, they could *show* that Frederick was bored, maybe by describing him.

"And what," I ask, "does someone look like when he's bored?"

As the answers trickle in—"He's slouching, kind of," "His arms are hangy"—I act them out until I am sprawled across the chair, mouth open, eyes glazed, arms dangling.

"Do I look bored?" I ask.

"Ye-ess," they agree.

"Yup. Either bored or dead." They laugh, being second graders. I'm glad the audience is with me today.

Back on my feet, I talk about some other writing principles, like writing about things they know and revising what they write. I show them a slide show of other kids who have published books. I hold up posters showing how I draw an illustration. I ask lots of questions, ranging from "How many colored pencils do you think I needed to draw this?" to "Have you ever done something you really didn't want your parents to know about?" And I use the answers to get my points across and make the kids feel involved. After fifty minutes I've used all my props and wind up the presentation. I ask for questions.

Answering questions is often more fun than giving the speech. Each group is likely to be different. But on this day all the questions they ask are ones I've answered before. My answers are smoothed by practice. I can remember other questions that weren't so easy.

A grubby sixth grader once blurted out, as soon as I'd invited questions, "Do you, like, have a life at *all?*"

Once a very small girl sat up and said, "I had a kitten once I named her Muffy and she had white fur but she died."

After another presentation, a scruffy boy asked, "Did you ever hit someone? I mean, hit someone really, really hard?"

"Uh, no," I answered. Which joke had prompted this line of thought?

"Oh. Well, are you gonna?"

An equally relevant question came from a third grader who pointed to my waist and asked, obviously very puzzled, "Mr. Shepard, why does your belt hang *down* like that?"

After the hour is up, I call an end to the questions and thank the kids for being a good audience. The teachers begin to clap, and the

Continued on page 8

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National Geography Bee—

continued from page 6

Just the Beginning

All my studying had paid off, but winning the Bee and earning the scholarship were only the beginning. I appeared on "Good Morning America" the day after the Bee; and later that summer I shocked Regis Philbin by telling him, on live TV, that he reminded me of my grandmother. It was thrilling to see myself on CNN and read about myself in newspapers around the country. I was surprised that so many people were interested in the Bee and sent me letters and articles from their local papers.

When I won, I was eleven years old and still in the sixth grade. Looking back, I think that I didn't really understand then what I had accomplished and that winning would open up opportunities for me that few teenagers ever have. A number of organizations asked me to speak; most exciting was being invited by Senator Robert Jubelirer to address the Pennsylvania Senate. My mother prepared me for disappointment beforehand, warning me that the senators were probably going to be too busy doing other things and that the speech was more for my benefit than for theirs. Imagine my surprise when senators gradually filled the chamber and sat down to listen to me. They interrupted my speech several times with applause and even gave me a standing ovation at the end. I don't know if I accomplished anything in the way of spurring lasting educational reform, but getting a standing ovation from the senators was one of the most exciting things that's ever happened to me!

The Pennsylvania Geographic Alliance, the state chapter of a national teachers' organization that encourages and supports geography education, frequently asked me to speak at events around the state, including summer geography seminars, geography education conferences, and school geography fairs.

With the encouragement of the Alliance and the support of Representative Richard Geist of Pennsylvania, I drafted an appropriations bill for funding for the Alliance; the bill passed in both the Senate and the House last year. I also served as a page in the State House of Representatives during the budget debates. Although it was gratifying to work on the bill, it was more interesting to observe the workings of state government firsthand. The political process was so intriguing that I hope to become involved in politics at some level in the future.

The National Geographic Society has also afforded me great opportunities to be active in promoting geography education—which has helped improve my public speaking and speech writing skills. At the 1992 state Bee, I addressed three groups in one day, and each audience required a different approach. (I was speechwriting in my sleep for almost an entire week.)

Perhaps the biggest educational event in which I participated was a 1992 press conference in Washington, during which the Department of Education and the National Endowment for the Humanities presented a matching grant to the National Geographic Society for the promotion of geography education. I spoke to an audience that included Lamar Alexander, George Bush's Secretary of Education; Gilbert Grosvenor, the president of the National Geographic Society; and Lynne Cheney, the chairwoman of the National Endowment for the Humanities.

As another direct result of winning the Bee, I was able to take advantage of quite a few academic opportunities. Accelerated in social studies, I took Advanced Placement American History (and scored a 5 on the AP test) as a ninth grader. My school also allowed me to begin a foreign language in eighth grade, putting me a year ahead of most other students; so I was able to start a second foreign language recently. By the time I graduate, I will have had four years of German and three of French.

Of course, earning all these opportunities required hard work. To me, the best thing about winning the Bee wasn't winning the scholarship or appearing on TV, but having the opportunity to encourage other students to learn all they can about geography and the world around us. ■

Susannah Batko-Yovino *is now an 11th grader at Shady Side Academy in Pittsburgh and enjoys reading, creative writing, piano, tennis, lacrosse, and horseback riding. She contributes to the school literary magazine and newspaper, volunteers at the local hospital and library, and is a member of an organization that seeks to foster political awareness.*

Public Speaking, Elementary Style—

continued from page 7

students join in a second later. Some kids wander to the front of the library and look through my props and ask questions, until their teachers call them back.

After the last one leaves, I gather my props together and wait for the next presentation, which will be much the same. A glance at the clock tells me my high school is in the middle of third period. I'll have to make up the schoolwork, I know. But that's tomorrow.

After the last presentation is finished today, I'll pack up my props and wait for my ride home. The librarian will hand me my check with a bright smile and say something polite and encouraging. I will be tired and will welcome the silence of home. But the students' faces will linger in my mind; I'll remember the ones that lit up and glowed, and I'll be satisfied to know that some of my words found their mark.

There is a bustle at the library door. I hear the next group coming in, early. There's usually one teacher who makes a point of coming early, just as there is one who personally directs each child to his or her proper rug space. I smile but remain distant as I wait for the others to trickle in.

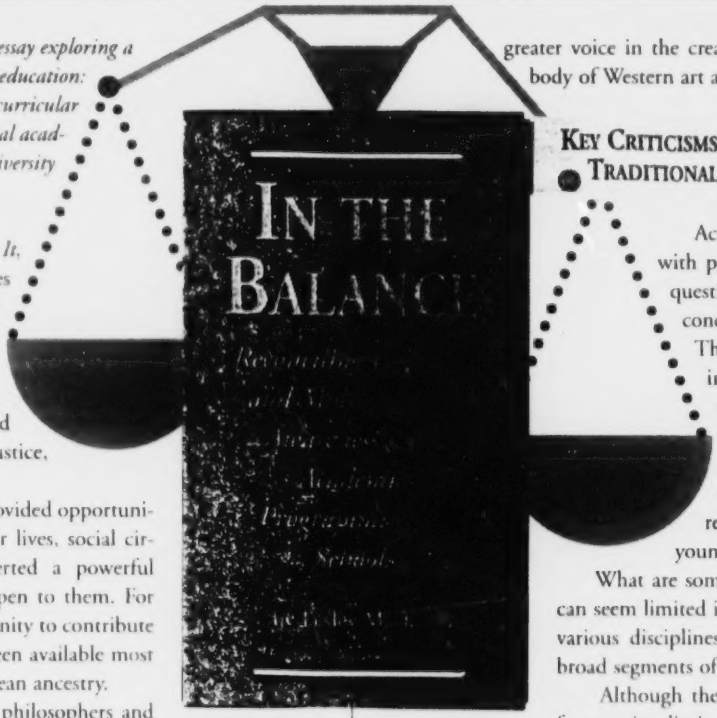
Finally the librarian emerges from behind her desk to introduce me, and the new group claps.

"Hi, guys," I say cheerfully. ■

For more information on Landmark Editions and to order Fogbound, *you may call (800) 653-BOOK. And if you missed Steven's "Writing for Publication" articles in* Imagine *last year, those issues are still available for $5 each—while supplies last. Call the JHU Press at (800) 548-1784.*

Steven Shepard *is in the tenth grade at Virginia's Thomas Jefferson High School for Science and Technology. He still enjoys writing for publication and also likes to participate in history, science, and piano competitions.*

We continue this series with a third essay exploring a controversial subject in the field of education: the debate in the academy over curricular revision—the modifying of traditional academic programs to reflect a greater diversity of origin and perspective.



In his comedy *As You Like It*, William Shakespeare compares the world to a stage upon which people assume many roles. In the course of a lifetime, Shakespeare continues, a young child becomes a school boy, and then often, a lover, a soldier, a justice, and an old man.

But while people are usually provided opportunities to play different parts in their lives, social circumstances have historically exerted a powerful influence on the range of roles open to them. For example, the freedom and opportunity to contribute to Western art and culture have been available most often to privileged males of European ancestry.

This is not to suggest that all philosophers and artists have benefitted from the most favorable social origins or that all those born into fortunate circumstances have become creative—clearly, opportunity is not the essential condition for invention. But most of the artistic and intellectual works traditionally passed on within our culture have been produced by individuals whose origins do not reflect the wide range of human circumstance. Should we continue to study their works in the time-honored ways? Or should a different kind of academic focus and approach be developed and implemented?

> *"ALL THE WORLD'S A STAGE,*
> *AND ALL THE MEN AND WOMEN MERELY PLAYERS;*
> *THEY HAVE THEIR EXITS AND THEIR ENTRANCES*
> *AND ONE MAN IN HIS TIME PLAYS MANY PARTS..."*
>
> **As You Like It,** *Act II, Scene VII*

The Core of the Debate

To help us make sense of these questions, let's return to Shakespeare. This playwright's vision and literary powers continue to startle readers and theatergoers today. Shakespeare's plays offer a recounting of human experience so rich in subtlety and dimension that for many they still represent the achievement of near-perfect expression.

But in her famous essay "A Room of One's Own" (1929)[1], Virginia Woolf wonders what would have happened if William Shakespeare had had a brilliant sister who, like her brother, decided to leave home to make her mark as a playwright in London. Woolf concludes that "Judith Shakespeare" would not have been able to transcend the limitations of her circumstances. She speculates that the young girl, as a female in the 16th century, would have died without being permitted to exercise her talents.

This hypothesis of the bitter fate of Shakespeare's imaginary sister expresses Woolf's understanding that, before modern times, women were overwhelmingly prevented from developing many of their gifts.

In more recent decades, a related concern has also been widely expressed: Not just women, but also people of color, have historically been denied the freedom and privileges that would have allowed them greater voice in the creation of the commonly accepted body of Western art and academic knowledge.

Key Criticisms of Traditional Curricula

Academic institutions now grapple with practical, as well as philosophical, questions regarding the impact of these concerns on what is taught in schools. The debate over curricula is most intense at the university level, where ethics and politics can be an outspoken part of everyday life. In this article, we focus on questions surrounding curricular revision as this revision affects young students in American schools.

What are some ways in which academic fields can seem limited in outlook? In what ways can the various disciplines seem to exclude the voices of broad segments of the human population?

Although these issues are extremely complex, four major limitations in traditional disciplinary studies have been posed:

1. *The classic texts that form the traditional cores of different academic disciplines have overwhelmingly been written by privileged males of European origin.* (Here, we need to acknowledge that the great majority of men of European ancestry have not been privileged and that, of course, these men constitute a diverse group and hold diverse perspectives.)

2. *This same social group has also greatly influenced academic outlooks.* For example, North American history is usually viewed in terms of the influential acts of privileged white men, and not in terms of the experiences or accomplishments of the common man or of those who belonged to other groups.

   Another example: Some biologists assert that their field has regarded the male body as primary and the female body as secondary. Thus, biological research has often been practiced, and its findings presented, in a way that accentuates a male-focused understanding of physiology and health.

3. *The same dominant group has defined the very terms of knowledge and analysis in particular fields.* To return to the example of history, a framework of historical periods has been developed that mirrors patterns of experience in the lives of white men, such as cultural movements—like the European Renaissance—pertaining to white males. The claim here is that, on the deepest possible level, the very structure of academic knowing is influenced by biases related to gender, race, and social class.

4. *A self-perpetuating neglect keeps academic disciplines from incorporating more complex perspectives.* For example, because relatively few academics and textbook writers know much about Native American civilization, American history and culture continue to be taught without reference to Native American experiences or accomplishments.

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Of course, not every teacher, researcher, student, or school administrator shares these perspectives. Although it may be more difficult to argue that something should remain as it is than to argue that it should be changed, compelling considerations do exist for maintaining traditional curricula in schools.

Arguments for Maintaining Traditional Academic Curricula

Traditional presentations of academic subjects allow for coherent learning and a deep understanding of the development of Western culture and thought, albeit from a unilinear perspective. This is the historical and intellectual legacy we have inherited, regardless of our ethnic, religious, or gender orientation; understanding this legacy is crucial to understanding ourselves. Traditional studies can thus provide us with insight into the concepts that organize our experiences.

Conservative approaches to academic disciplines can also reflect a realistic understanding of our culture. For example, the fact that, in early American history, political leadership was largely exercised by members of a highly exclusive social group is unfortunate; but denying this fact will only confuse students and detract from important historical understandings.

We need to know about the lives and actions of those who provided leadership at different points of history, even if we now question the social context that facilitated their rise to power. We also need to understand and value what was noble, courageous, and sometimes heroic in the lives and creative contributions of these leaders.

Attempting to make an objective approach to academic fields can also produce understandings that are superior to those shaped by contemporary ideas about the way the world should be. Traditional historical studies, for example, have produced standards of research, documentation, and other aspects of methodology that are valuable and even essential to our ability to understand the past.

Nevertheless, the concerns that have been voiced about traditional academic approaches have reached every discipline, from the humanities to the social sciences and even to pure and applied science. To simplify our look at some forms of curricular revision that have been proposed and practiced, we will focus on the study of literature.

Problems with Literary "Greatness"

Before the last few decades, literary studies were organized according to a "canon" of widely accepted great books—classics whose status was rarely disputed. Now, however, the canon is disputed; the idea of a fixed set of literary greats is no longer broadly accepted.

"Greatness" has become a highly controversial notion in contemporary academic circles. According to an influential strand of current thinking, decisions about what is great necessarily rely on one's own particular perspective. And one's own particular perspective, the argument follows, is far from universal. Rather, it is shaped by one's gender, ethnic background, and social class, and by the cultural "truths" that are compatible with one's social orientation.

We will address the important issue of judgments about greatness at the conclusion of this article. For now, we need only clarify that literature once held to be of the highest order is increasingly criticized for racist or sexist premises or for biases regarding social class.

Examples? John Milton's "Paradise Lost" is considered sexist by many for its portrait of the wayward moral character of Eve in the Garden of Eden. (We will return to the example of this poem shortly.) Works by novelists from Jane Austen to John Updike are analyzed and criticized for their attitudes towards rich and poor. And it is obvious that the entire body of what is conventionally taught as English literature not only includes few works by nonwhite authors, but also mostly neglects characterizing people of color and avoids complex treatments of racial issues.

But these observations, while valuable in their own right, cannot resolve questions about what should be included in academic programs. No matter how much we might regret signs of exclusivity in what we recognize as English literature, we must inevitably face the question, "So what?" What should we do about it now?

Attempts to Design More Inclusive Curricula

Here are some of the solutions that have been implemented in order to increase diversity of perspective in literary studies, as well as some criticisms these strategies have engendered. These practices have also been adapted and applied in many other disciplines, as well.

1. Expand the range of what is studied.

Many literature courses now incorporate a greater number of works by "minority" authors—by women, people of color, and others with differing backgrounds—and works by writers from non-European cultures. This change has come about easily in courses featuring modern writers; twentieth century literature by diverse authors is abundant and includes many works that are widely held in high regard.

2. Unearth or discover previously unknown or little-known writers whose work has, at the least, historical merit as an artifact of an earlier time.

This has been a prominent strategy of feminist literary scholars in the past two decades, as well as of some scholars of nonwhite backgrounds. In fact, discovering and promoting the study of minority writers—including women—has become a robust industry within academia.

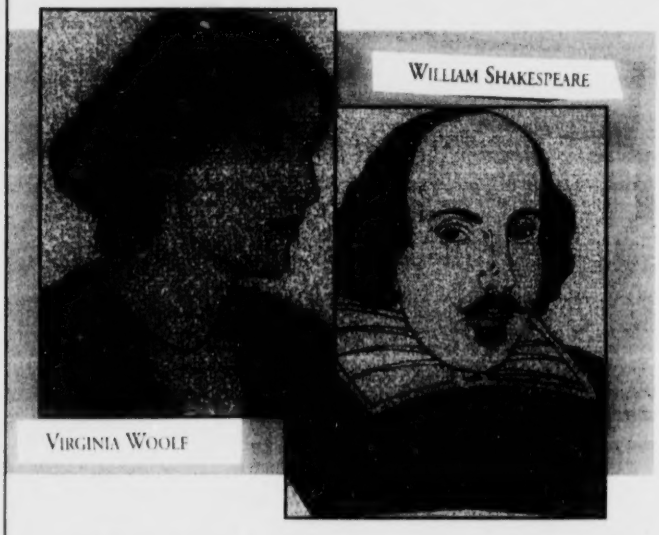
This approach raises the difficult question of literary merit. To some extent, the widespread promotion of previously unknown writing has caused others to accuse the discoverers of neglecting questions about literary quality.

How should a poem written by a female imprisoned in slavery who taught herself to write be approached? How should that poem be studied? How should it be compared with poems in a curriculum chosen because of what has traditionally been considered literary merit? Within a limited curriculum, to what extent should poems written by underprivileged or harshly exploited persons displace those by others who enjoyed every advantage? These and other difficult questions have surfaced with the rise to prominence of previously obscure works.

3. Discuss literary works in terms of their open or disguised treatment of racial, gender, and class issues.

This approach to the traditional greats is probably a permanent feature of literary studies. How can young women who believe in the equality of the sexes fail to notice that Milton uses Eve as a symbol of human corruption? How can African-American students fail to be interested in Melville's treatment of black characters in *Moby Dick*?

A heightened sensitivity to these textual components can, like any increased awareness, strengthen readers' relationships with the books they read. But at the same time, an overwhelming emphasis on race, gender, and social class can lead to simplistic understandings of literary works.



4. Discuss the ways in which the organization of academic knowledge and the objects of academic study may reflect fundamental biases.

This radical strategy promotes a highly critical approach to academic learning. It fosters a kind of analysis in which basic forms of human expression, such as works of literature, can be subjected to profound social critiques.

The plays of Ancient Greece, for example, may be approached almost as representations of racism, sexism, and elitism in the culture that produced them. These plays might be treated as fundamentally compromised because of flaws in Ancient Greek society, such as the existence of slavery or the generally exclusive nature of Ancient Greek culture.

This kind of analysis can produce some valuable insights, but is difficult to carry off productively. Sweeping identifications of bias in creative works can easily deteriorate into oversimplification.

One significant hazard in this approach to learning is that the intense mixing of artistic study and social criticism can lend itself to highly judgmental perspectives. Classrooms in which this kind of approach features prominently are sometimes criticized for engendering intolerance towards those with differing, less politicized outlooks.

A Balanced Approach to Academic Understanding

Art, knowledge, politics, and ethics can probably never be reconciled to anyone's full satisfaction. Rather than struggle for an "ideal" resolution of academic norms and social sensitivities, we might instead aim for balance when these two sets of standards seem in conflict.

This balance will involve recognizing—and even enjoying—the complexity of these issues. Perhaps the only incorrect response to uncertainty about how things should be studied is to trivialize attitudes that are different from one's own or to deny the importance of the discussion.

What might a balanced perspective entail, for example, with respect to signs of sexism in Milton's "Paradise Lost"?

An open-minded approach might involve recognizing that signs of an anti-female perspective in this poem can usefully be examined and discussed. Insights into relationships that historically have involved the abuse of power can shed light not only on particular works, but also on the human condition.

At the same time, balance requires considering whether it is adequate to approach a complex work of literature primarily on the basis of its "fairness" to women.

Milton may have been a sexist; sexism was commonplace in his time. But in the balance, "Paradise Lost" offers much more than the opportunity to criticize its author's attitudes towards women: it offers a story through which to examine the mysterious, poetic workings of an inspired human mind.

Standards of Excellence

Thinking about the complex, even mysterious, nature of literature—and according to modern scholarship, of history, philosophy, science, and mathematics—can help us come to terms with the question of greatness raised earlier in our discussion. Perhaps complexity is what makes certain works great.

Harvard-based African-American literary scholar Henry Louis Gates believes that the old-fashioned canon can no longer be defended and that a more diverse "alternative canon" must be created. At the same time, he argues that "...some works are better than others." Some texts, he believes, "use language that is more complex, more compelling, richer".[2] Professor Gates asserts that the alternative canon must be integrated with texts by minority writers that meet these high standards.

Professor Gates' views, while uniquely his own, reflect an awareness of the different sides of the literary studies debate. Sensitive to the desire for inclusion expressed by those of minority heritage, he nevertheless upholds the value of traditional standards of excellence.

Why Traditional Standards Are Important

As we engage in the task of examining what we study, we must resist the temptation to throw out the baby with the bathwater. Some may feel that a steady diet of writers like Milton and Melville is hopelessly inadequate; at the same time, it is important to appreciate what these authors still have to offer us.

One often-unrecognized value of the traditional greats in literature, philosophy, and other disciplines is that many such texts provide students with examples of questioning, skeptical thinking. In fact, the "Great Books" written by white men of European heritage are not nearly as conservative as they are sometimes held to be.

Take, for example, two writers central to American philosophy and literature: Ralph Waldo Emerson and Henry David Thoreau. As many students know, Emerson was a cranky individualist who advocated an ornery "self-reliance"—that is, thinking for oneself. And Thoreau's most famous essay advocates breaking laws that are in conflict with one's convictions, an act he termed "civil disobedience." These two allegedly-mainstream white male thinkers, as well as many others who are included in the traditional canon, can help students think more critically about society, its institutions, and its norms.

Traditional studies are important for another essential reason: they are rigorous and demanding. They teach students not just about central ideas in human civilization; they teach students how to think.

The educational value of classic texts and traditions may ultimately lie in the valuable demands they place on students. As cultural literacy unfortunately declines, as we know increasingly less about history, geography, philosophy, and literature, traditional scholarship still holds the promise of teaching us much and helping us to strengthen and refine our intellectual abilities.

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continued on page 13

A Creative Writing Career—
Can You Get There from Here?

by Charles Beckman

On a cool Vermont day, you pause from your writing. The window of your study frames a vista of a dewy New England autumn morning. Bright leaves hang heavily on the maple trees, and white trunks of birch trees bracket a fenced pasture. Near a barn, horses meander along a low rock wall. Sudden inspiration returns you to your novel-in-progress.

On a hot day in the city, two letters arrive in the mail. One is from the journal to which you sent ten poems. Inside are your poems and a curt note: "Sorry, not our style." The second letter, from the gas company, reads, "Your account is delinquent and has been referred to a collection agency." A strong burning odor wafts through your room—someone has set the trash barrel in the alley on fire again.

Future writers:
How many of you believe that the first scenario is realistic? How many, the second?

If novelist and Johns Hopkins professor John Barth is right, it's much more likely you'll start out in the second scenario. In an essay in his collection, *The Friday Book*, Barth calculates that U.S. colleges confer advanced academic degrees (M.A. or better) on 2,500 people each year—in *fiction* writing alone. Add poets and the number quite possibly doubles. Given the meager number of first books published each year, it's obvious that a lot of would-be creative writers presently sustain themselves by means other than the profession they yearn for.

Should this information deter you from your dream of being a fiction writer or poet? Surely not! Every profession has its lore of dues-paying and career ladder-climbing. It's true that a writing career is risky—unfortunately, no Fortune 500 company has current openings for fiction writers or poets. Still, some writers *do* get published. And colleges *do* hire poets and other writers to teach in writing programs.

There's no denying that the competition for such positions is fierce, but these aren't your only options. While waiting to be discovered by *The New Yorker*, good writers can also apply their understanding of fiction writing or poetry to other careers.

Worthwhile Knowledge is Never Wasted

A trial lawyer makes a living by telling a dramatic story in which the client is the sympathetic main character; by drawing on a background in fiction, the lawyer can make that drama more compelling. Or a poet, sensitized to words and their connotations, may land a job in automotive advertising and then be able to tell General Motors why naming its new ultra-compact electric car prototype *Impact* would be a bad idea. (Too late—they did it, anyway.)

Even if fiction or poetry writing can't guarantee your financial stability, it can provide a sense of personal fulfillment in your off-work hours. Remember that Anton Chekhov was a doctor, and the great twentieth century poet Wallace Stevens lived well as the vice president of a major insurance company.

Of course, the literary world still acknowledges displays of astonishing talent. So don't let the threat of competition prevent you from pursuing a field that interests you. While you can't count on making a million dollars, you *can* strive to write compellingly about what Aristotle called "human drama—its happiness and its misery."

Let's take the first step—developing your talent. Creative writing has more in common with endeavors in the fine arts—such as dance, music, or sculpture—than with the study of academic disciplines. Just as someone interested in learning to play classical piano should seek out a performing pianist rather than a music critic, so you ideally should find a teacher who is a practicing fiction writer or poet with experience in teaching writing.

When you're in doubt about your ability, a good place to find wisdom is in the ancient proverbs. Every aspiring writer should tape this one to the computer terminal: "The journey of a thousand miles begins with a single step."

Non-literature-based writing courses are not commonly available in public schools, although some public and private schools do offer them. And they're widely offered at the college level, sometimes in continuing education departments which have fewer restrictions about admitting younger students.

Make Your Choices Thoughtfully

If you're considering signing up for a course, or working with a tutor, here are some things to look for:

- *Above all, a good writing teacher should provide thoughtful feedback on your thoughtfully-produced work.* "A+—terrific!" and a smiley face are nice, but they don't give you much direction. More helpful feedback consists of line-by-line notes, then a longer commentary at the end of an essay. The comments might be positive, or negative, or simply descriptive. As descriptive feedback, the instructor may write, "In this paragraph I'm understanding that your dilemma was either to shoot an elephant or 'lose face' before the Burmese citizens." This can help you decide if you've successfully made your point.

  Extensive commentary takes time—probably more time than a teacher with 150 students can give. If you're serious about writing and can't get what you need in your school, look elsewhere. Local colleges and summer programs are good places to investigate.
- *A good teacher views writing as a process and gives feedback at many stages in your composing process*—while you're brainstorming ideas for an essay and developing a focus, as you're writing the first draft, and even when you tackle the revisions that follow.
- *A good teacher provides you with tools and techniques to make your writing more compelling.* Did you know, for example, that a sentence that activates two of a reader's senses can be more vivid than a sentence that involves just one? Or that just limiting the number of times you use forms of the verb "to be" can spice up your writing? Writing teachers can pass along tricks like these to help you create memorable prose.
- *A good teacher expects you to rewrite your work.* Comprehensive revision—not just

correcting mistakes, but finding better means of expression—are part and parcel of what real writers do, whether in response to a personal quest for perfection or an editor's requirements.

- *A good writing teacher stimulates your awareness of the enormity and variety of the literary tradition that precedes you.* Reading widely helps you appreciate not just the continuing themes in literature but also stylistic differences, which you can then experiment with in your own work.
- *A good writing teacher holds you to high—but not unreasonable—standards.* He or she might ask you to identify a magazine you respect for its literary merits, to study the writing it publishes, and then to attempt to write an article for it.
- *A good writing teacher helps you develop good habits,* such as writing often, being self-evaluative, writing with purpose, and considering your audience.

If you're lucky, at some point one of your teachers may become your mentor—someone you respect who takes a professional, personal, and possibly long-term interest in your development in a particular field. Mine is a professor at the college I attended, who spent hours critiquing my writing, recommended good graduate writing programs, and made sure I got the job of escorting famous writers back and forth to college readings. Even though it's been a dozen years since college, I still consult with her about my writing, and she still offers encouragement and good advice.

Persevere toward Your Goal

Fiction and poetry writing reveal the human spirit and have a great impact on our culture. In an age that mints nearly as many writers as pennies, talent and drive are prerequisites for success as a writer. Consistent practice now—with the help of good teachers and a mentor—can help you develop your writing skills and determine sooner rather than later the heights to which you may aspire. ■

Charles Beckman *holds an M.A. from The Writing Seminars at The Johns Hopkins University and is an assistant director of Academic Programs at the JHU Center for Talented Youth.*

In the Balance—*continued from page 11*

Whose Text Is It, Anyway?

"Of course he wrote it for me; that is a condition of the black woman. Nobody else understands it, but I ***know*** *that William Shakespeare was a black woman."*

—Maya Angelou[3]

When Maya Angelou writes what she knows Shakespeare was a black woman, she does not mean this literally. She is not denying the particular existence of the white playwright Shakespeare in the 16th century. And she is not ignoring the unique sufferings, victories, or day-to-day experiences of black women.

What Ms. Angelou means is that Shakespeare's plays and poetry are so powerful that they are able to speak for her. In other words, Shakespeare expressed such profound insights into human nature and achieved such rich effects with language that his writing transcended the particularities of his own background. Four centuries after he wrote, his works still articulate human truths in a way that rings true for a quite different human being.

We need to be careful with this point of view. A belief in human truths and in language's capacity to speak for those with different backgrounds does not diminish the importance of particular perspectives or the necessity that people everywhere educate themselves about experiences different from their own.

But it is helpful to consider that texts may not belong to the single individual—female or male, black, indigenous, Asian, or white—who wrote them. Instead, texts may, to a large extent, belong to the times in which they were created. And ultimately, the richest texts may belong to the whole of humanity.

So, to return to Virginia Woolf, perhaps it is true that "...masterpieces are not single and solitary births; they are the outcome of many years of thinking in common, of thinking by the body of the people, so that the experience of the mass is behind the single voice."[4]

In that sense, rich imaginative works from every period of history and from many different points of view can be said to belong to us all. ■

1. Woolf, Virginia (1929). *A Room of One's Own* (p. 49). San Diego: Harcourt Brace Jovanovich.
2. D'Souza, Dinesh (1991). *Illiberal Education: The Politics of Race and Sex on Campus* (p. 172). New York: Random House.
3. D'Souza, p. 157.
4. Woolf, p. 68.

Learning Takes Place Anywhere and Everywhere

Although our discussion has treated questions concerned with what should be studied in schools, let's remember that learning is not confined to classrooms! Students are free to learn in countless environments. Books, topics, and perspectives not covered in school can always be pursued in libraries, community centers, and other locations.

Of course, the question of what is included in academic curricula is significant: material covered in schools has a special, elevated status in our culture. But students—and that means all of us—should seek out opportunities to enhance our knowledge whenever and wherever we can.

Further Reading on Diversity and Schools

- Banks, J.A., & Banks, C.A.M. (Eds.). *Multicultural Education: Issues and Perspectives.* Boston: Allyn and Bacon.
- Gilbert, S.M., & Gubar, S. (1979). *The Madwoman in the Attic: The Woman Writer and the Nineteenth-century Imagination.* New Haven: Yale University Press.
- Himmelfarb, G. (1994). *On Looking into the Abyss: Untimely Thoughts on Culture and Society.* New York: Knopf.
- Miller, J.J. (Ed.) (1994). *Alternatives to Afrocentrism.* New York: Center for the New American Community, Manhattan Institute.

FASCINATING CLASSICS

GREAT EXPECTATIONS

by Lesley Mackay & Amanda Claybaugh

As you read through this continuation of our literary classics series, consider how your own ideas about the novel compare with those of our two writers.

Lesley: *Amanda, did you realize that only 45 years separate the publication of* Emma *and* Great Expectations*?*

Amanda: *Yes,* Emma *was published in 1816 and* Great Expectations *in 1861. But in spite of their relatively close birthdays, I don't think these books have all that much in common. How about you?*

Lesley: I agree that the two novels offer very different versions of life and experience. Both are about growing up. But injustice figures so prominently in the world that Dickens's main character, Pip, grows up into that his personal development is sometimes at risk.

In *Emma*, the reader is led to believe that what is, is fair and must be accepted. Not surprisingly, Jane Austen does not explore the lives of those born into extreme circumstances: Emma visits a poor family, but we are never introduced to any of its members; Harriet Smith bumps into a group of wayfaring gypsies, but their histories remain outside the world of Austen's novel.

Charles Dickens sets out on new ground with a main character who is not only poor and orphaned, but also mistreated. Mrs. Gargery, the older sister who raises Pip "by hand," prides herself on her harshness to him. Even worse, her cruelty to Pip is approved of by other members of their community. Dickens uses this brutality towards a child as a powerful symbol of everyday injustice.

So affected is Pip by the punishing attitudes of his elders that he becomes haunted by fears of condemnation and imprisonment. Dickens weaves convicts, prisons, the courts, and heartless lawyers into his tale, forcing Pip to face his obsessions.

Amanda: I agree with you, Lesley, that Pip suffers a great deal, but I don't think Dickens views him as a victim. Pip evolves from a helpless child into an Englishman striving to improve his social status.

Pip's desire to be a gentleman, and his efforts to learn how to become one, are used to represent the desires and efforts of an entire social class. Education was crucial to these efforts, as a scene early in the novel reveals.

After finally making his way through the "bramble-brush" of the alphabet, Pip shows off his new learning by writing a note to Joe. Joe delights in finding the two letters that he uses to spell his name, and Pip promises to teach him the rest. Before Joe accepts this offer, however, he warns Pip that their study together must be kept a secret from Mrs. Joe, because "she an't over partial to having scholars on the premises . . . and in partickler would not be over partial to my being a scholar, for fear as I might rise. Like a sort of rebel." Because we have read Pip's note for ourselves, we can laugh at Joe's caution. Anyone who writes "i opE i shAl son B haBell. 4 2 teeDge U JO" is not yet ready to teach others to rise up and rebel.

While this scene is comic, it does point to one of the novel's most serious questions: can a "common" man become a gentleman? At the evening school run by Mr. Wopsle's great aunt, Pip may have learned more about eating apples and putting straws down the backs of his classmates than about reading and writing. Still, it is to this school that Pip turns for guidance after Estella calls him "common."

When Estella laughs at the thickness of his boots and the coarseness of his hands, Pip at first wishes that he had been "more genteelly brought up." He soon begins to think about his deficiencies in slightly different terms, however, as he starts to regret his "ignorance." This shift in Pip's thinking is crucial, for while he cannot change the way he has been brought up, he can certainly go to school to remedy his ignorance. So Pip tells Biddy that he has a "particular reason for wanting to get on in life" and asks her to "impart all her learning" to him. He hopes to learn enough to become a gentleman, and he begins by copying from a newspaper an elaborate letter *D*.

Although Pip realizes quickly that it will be hard to become a gentleman "under these circumstances," he persists in his attempts even after he is apprenticed to Joe as a blacksmith. Then a mysterious benefactor intervenes, and Pip begins his apprenticeship as a gentleman. He goes to live with the Pockets, who continue teaching him on a much grander scale the lessons that Biddy had begun. While Pip learns from Matthew Pocket the academic subjects that all gentlemen should know, he learns from Herbert Pocket the required social graces. By the time that Pip's benefactor is revealed, Pip has been "made a gentleman" in the eyes of the world.

The idea that education shapes social status is so common to us that, at first, it seems entirely unremarkable. But it is impossible to imagine Pip's dramatic rise occurring in the world of Jane Austen: Emma Woodhouse and Harriet Smith may plan to read edifying books together, but reading cannot turn Harriet into a lady. So the story of Pip, when Dickens told it, was a new one. It was, however, clearly not unique: Biddy evolves from a neglected orphan to a respected schoolmistress, and Joe finally learns to write letters for himself. The child they have together closely resembles Pip.

Early in the novel, Dickens tells us that Joe's learning was, "like Steam, yet in its infancy." In this significant phrase, Dickens introduces the most powerful emblem of the industrial revolution and links it to the idea of education. Steam and education seem to be growing out of their infancies together, helping one another to maturity; this was, in fact, what happened in England during the industrial revolution. As industrialization spread throughout the country, so did universal schooling. Most workers received some education, and many believed that they would learn enough to ensure that their sons could enjoy a better life. They took Pip's story as their own.

Lesley: Although it's true that *Great Expectations* explores the possibility of becoming a gentleman, I also think Dickens questions whether becoming a gentleman is a worthy goal.

Reading this novel, we soon realize that Herbert Pocket is the only admirable gentleman in it. The snobbishness of Bentley Drummle, the cunning of Compeyson, and the negligence of Matthew Pocket stand in sharp contrast to the wisdom and goodness shown by Biddy and Joe. By surprising us with goodness in the "common," and shabbiness in the supposedly more refined, Dickens shows his readers that personal integrity is not dependent on social status.

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This novel must be read on more than one level. As Dickens seems seriously to explore an idea—for example, gentlemanliness—he can also be spotted attacking that idea. Take the name of this book, for example. What does Dickens mean to suggest by his romantic title *Great Expectations?* If we read the novel closely, we understand that he employs this title ironically; in fact, Pip's great expectations are never fulfilled.

Irony, humor, and satire abound in *Great Expectations.* These qualities, often used to point out hypocrisy in human interaction, can sometimes seem at odds with the novel's serious moral convictions. For example, the scenes in which Mrs. Gargery goes on the rampage are full of slapstick humor; at the same time, Dickens wants us to understand that she is behaving in an abusive way.

Dickens turns especially ironic, sometimes bitterly so, when he turns to the subject of money. Money is a dangerous ingredient in Pip's new life. When Pip mysteriously becomes wealthy, he mistakes his wealth for a sign of personal superiority, as do the many people he encounters who are eager for a share of his riches. Even the humble Joe starts calling Pip "sir."

In one of the most devastating scenes in the novel, Pip goes to a tailor, Mr. Trabb, to buy new clothes suitable for a young man of financial means. Mr. Trabb employs a boy whom he terrorizes in front of Pip in a manner almost identical to the way Pip's sister mistreated him a short time before. But Pip, instead of feeling outrage and sympathy for the boy, is so seduced by Mr. Trabb's flattery towards him that he sympathizes instead with the boy's abuser. At this point in the novel, we are not sure if Pip will survive his distorted outlook, if he can become a better person.

The character of Estella and her role in Dickens' plot also illustrates how irony and surprising reversals add dimension and shading to this story. When Pip meets the ravishing and disdainful Estella, she captivates him not only with her beauty, but also with her scorn towards him. Pip sets himself the task of winning her. When he is mysteriously provided a handsome income, he starts to believe that his relationship with her is meant to be, that some powerful influence—he hopes it is Miss Havisham—has charted a noble destiny for him in which he will leave behind his humble origins.

Amanda: Yes, but then Pip's hopes are dashed. By the end of the novel, it is revealed that Estella was not born into "good family" as Pip had always assumed; instead, her family connections link her to the unrefined side of life Pip most fears and from which he has tried so hard to separate himself.

This seems the ultimate blow to Pip's great expectations: the twists and turns in the novel's plot show no clear division between the uneducated and the genteel, the crude and the seemingly civilized. Human beings, Dickens suggests, partake of both sides. Thus, Dickens transports us far away from the perfectly ordered world and the perfectly happy ending that Jane Austen provided in *Emma.*

Yet, at the same time, this is not a cynical novel. There are some excellent people in *Great Expectations.* Joe, Biddy, and Herbert Pocket are exemplary characters whose generosity, compassion, and integrity strengthen Pip and prevent him from becoming a deformed caricature like Mr. Jaggers.

But Joe and Biddy live the humble life that Pip left behind, and for this reason Pip agonizes over his relationship with them. These two characters raise the painful question of Pip's impoverished beginnings. Pip loves them but, especially at the beginning of his quest for self-improvement, he struggles with a desire to distance himself from them.

Gradually, Pip gets turned around by life and its lessons. By the end of the novel, he has seen the nobility in Joe and has even wanted to propose marriage to Biddy. He has also come to care deeply for the convicts, whose extreme lack of social graces had previously inspired Pip's loathing.

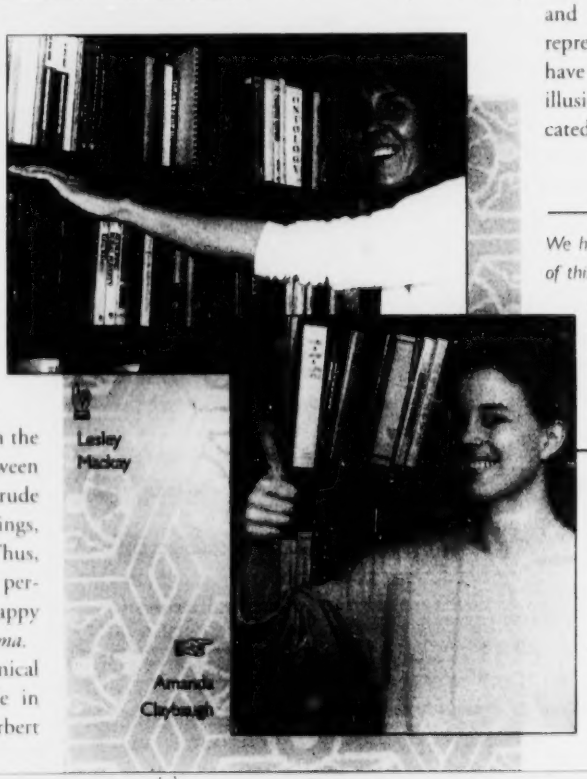
While Pip largely resolves his relationships with those who show him kindness and forgiveness, he has more trouble coming to terms with his complicated relationship with Estella.

Lesley: Even more interesting, Dickens himself seems unable to come to terms with Estella!

Curiously, Dickens wrote two different final chapters for *Great Expectations,* and the novel is usually published with both of them. In the first ending, an older Pip happens to run into Estella, who is married for the second time. Her face is chastened with the sorrow of a previous, unhappy marriage. She is kind to Pip, but they do not reconcile. In this ending, Pip's most significant friendship is with his good friend, Herbert Pocket, whom he has followed out to the Orient where they work hard to earn a living. Pip is a good man, but he is essentially alone and his earlier ambitions have been completely destroyed.

It is understandable that some of Dickens' contemporary readers would have found this ending sad and harsh. In the happier ending Dickens wrote at the urging of a friend, Pip and Estella are finally united.

The existence of the two endings suggests uncertainty on the part of Dickens. I imagine he wasn't sure whether to leave his hero all alone or portray romantic love as having the power to conquer life and circumstance. In any case it's important to remember that even the reunion of Pip and Estella in the happier ending does not represent a fairy-tale conclusion. They both have suffered and have been stripped of many illusions. Life has proved to be more complicated than Pip had expected it would be. ■



We have modified the reading list for the remainder of this year's Fascinating Classics series. The novel to read in preparation for our January/February issue is Charlotte Bronte's Jane Eyre. *Then we will continue with F. Scott Fitzgerald's* The Great Gatsby, *followed by Maya Angelou's* I Know Why the Caged Bird Sings.

Lesley Mackay, *who holds a B.A. from the College of William and Mary and an M.A. in English from Indiana University, is CTY's Staff Writer.* ***Amanda Claybaugh,*** *formerly a member of* Imagine*'s editorial staff, graduated from Yale and is now pursuing a Ph.D. in English at Harvard University.*

by Wayne Parker, Ph.D.

In our March/April issue, Progna Choudhury offered a student's perspective on the International Baccalaureate program. Here, a former IB instructor provides a teacher's look at the path toward achieving an IB diploma.

Students wanting a more challenging high school curriculum would be wise to investigate the International Baccalaureate (IB). Originally designed to provide the children of diplomatic families with a classical European education, the IB is now available as an alternative to the Advanced Placement program in American schools certified to offer it. Currently, 85 percent of the over 200 IB diploma programs in the United States and Canada are offered by public schools.

The International Baccalaureate Organisation in Geneva, Switzerland, is responsible for ensuring consistency of standards worldwide. The IBO supervises all curricula, writes all final exams, and oversees the grading of all required exams, projects, and papers. An IB diploma is granted only to those who do well in the finals: 20 to 25 hours of essays (three to five hours each; no multiple choice questions) given to all IB students on the same day. Many American colleges and universities grant college credit for solid IB performance and may admit IB diploma holders as sophomores.

IB Diploma

The two-year IB program starts in the junior year and is geared toward the generalist. To earn an IB diploma, a student must:

- ***Earn credits in six academic categories***—mathematics, native language, foreign language, experimental sciences, humanities, and electives. At least three of the six must be two-year Higher Level courses. (Colleges are more likely to offer a one-year waiver to those with four Higher Level courses.)
- ***Complete a year-long interdisciplinary Theory of Knowledge (ToK) course,*** which explores the interrelationships among various disciplines and ensures that students engage in critical reflection and analysis of knowledge acquired within and outside the classroom.
- ***Engage in at least 150 hours of approved extracurricular activities, including community service.***
- ***Write a 4,000-word independent research paper known as the Extended Essay.***

IB Curricula

As an IB teacher, I found the expectations and requirements of the IB program to be extraordinarily rigorous. At the beginning of the two-year courses, students are typically assigned ten to fifteen significant books in the field. They are expected to master each book and be prepared to write interpretative essays for the final exam. Original sources, rather than traditional textbooks, are heavily emphasized: in history, students read diplomatic dispatches and scrutinize treaties; in psychology, they read Freud; in economics, they read Weber.

Students must demonstate proficiency in their native language and one other. Not for beginners, foreign language courses require at least two and preferably three years of background. To pass the final, the student must be able to think in the language and to read, write, and interpret its literature in essays and tape-recorded interview.

In mathematics, courses offered usually advance through calculus. The focus is on the logical process involved in dealing with very difficult math problems, not just on getting the right answer. In experimental sciences, the goal is to acquire deeper understanding in one area rather than more superficial knowledge in a variety of sciences; it's not unusual to take two years of chemistry or physics, for example. Math is heavily integrated into the science courses. Lab notebooks are among the items that are sent to Cardiff, Wales, for grading.

Electives give students an opportunity to emphasize their greatest strength. They may choose (1) another course in the humanities, science, or modern language categories; (2) another option including art/design, music, computing, classical languages; or (3) a course developed by an individual school and approved by IB. (For art, a portfolio is required; for music, a performance tape.)

The Theory of Knowledge course examines two broad questions: What is the nature of truth, and how do we know it? This study integrates information from all disciplines and cross-culturally, distinguishing and examining commonalities and differences. The Extended Essay must be the student's original work, not a summary of work others have done.

Benefits for Students *and* Teachers

Teaching in the IB program was extremely satisfying. I enjoyed working with the students, who had to be bright, achievement oriented, and willing to work quite hard in order to earn a diploma. Also, within the IB guidelines, teachers could be creative: When I was teaching in Caracas, I designed a course in International Relations (certified by IB as an elective) which examined the history of this field and the function and structure of the United Nations, then studied specific regions and countries in depth. Every spring, we traveled to the Netherlands to compete in The Hague International Model UN and took the opportunity to visit other countries we had studied.

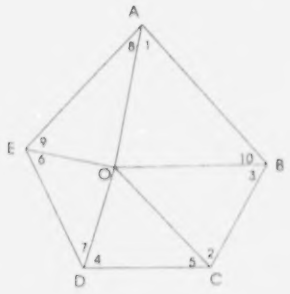
Many of my former students who had obtained IB diplomas later told me that they found the first year of college less demanding than the IB. They believed that the program, though intense and sometimes exhausting, was well worth it because of the growth they had made during this enriched educational experience. ■

- The IB diploma is geared toward the generalist. However, if you cannot meet these exacting standards in all academic areas, some schools may still allow you to take specific courses that meet your needs. For every IB exam you pass, you are granted an IB certificate. Schools just entering the IB program, however, must demonstrate that they have the resources to offer a full diploma.
- Students interested in locating IB schools—or North American schools that want to explore the possibility of offering the International Baccalaureate program—should inquire from **International Baccalaureate North America, 200 Madison Avenue, New York, NY 10016; (212) 696-4464, fax (212) 889-9242.**

Wayne Parker *holds a Ph.D. in Educational Psychology Research, a field he now pursues at JHU's Center for Talented Youth. He has taught IB courses in Vienna, Austria, and Caracas, Venezuela.*

1. Given $f(x) = \frac{4^x}{4^x + 2}$, find $f(\frac{1}{1001}) + f(\frac{2}{1001}) + f(\frac{3}{1001}) + \cdots + f(\frac{1001}{1001})$.

2. O is an interior point in the convex pentagon ABCDE, and $\angle 1 = \angle 2$, $\angle 3 = \angle 4$, $\angle 5 = \angle 6$, and $\angle 7 = \angle 8$. Show that $\angle 9$ and $\angle 10$ are either congruent or supplementary.



3. A wooden rectangular solid with width w units, length l units, and height h units, where w, l, and h are integers and $6 \le w \le l \le h$, is painted red all over. By slices parallel to its faces, the solid is cut into wlh smaller cubes, each of unit edge length. If the number of the cubes with just one face painted red is subtracted from the sum of the number of the cubes completely free of paint and the number of cubes with exactly two faces painted red, the difference is equal to 1994. Find w, l, and h.

4. What is the largest possible value of n such that in any 50-number subset of {1,2,3 . . . n} there exist two numbers whose difference equals 7?

5. The lengths of six edges of a tetrahedron are 2, 3, 3, 4, 5, and 5. What is the largest possible volume of the tetrahedron?

***Solutions to the problems listed above will appear in the next issue of* Imagine.**

Mr. Feng teaches mathematics at the Oklahoma School of Science and Mathematics (OSSM) and has coached many students who have competed successfully in mathematics contests in China and the U.S. In this column, Mr. Feng offers *Imagine* readers questions designed to improve their problem-solving skills.

Solution to Brain Teaser in September/October issue of *Imagine:*

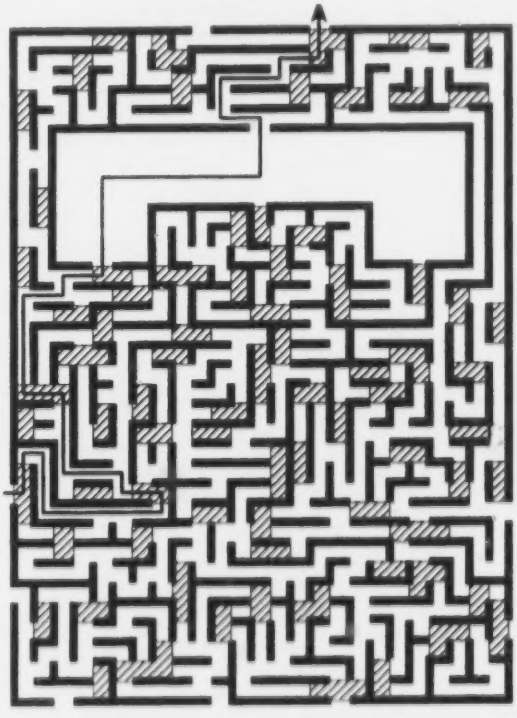
If the boy is telling the truth, then the lady and the wise man lied the second time. That would imply that the lady also lied the first time, but the wise man told the truth the first time. This is not consistent with the reliable psychic's observation that only the lady or the old man could have told the truth the first time and lied the second. Thus, the boy must not be telling the truth.

Since the boy is lying, then both the lady and the wise man were truthful on both occasions, and the old man was lying the second time. The boy and the old man must also have lied the first time, since we know two people lied the first time, and they are the only two left.

This puzzle just goes to show that things would be easier if everyone told the truth.

—Alejandro Jenkins

Solution to Tim Boester's Puzzle in September/October issue of *Imagine:*



STUDENTS REVIEW

THE UNIVERSITY OF MICHIGAN

College Review Series

This on-going series is intended to aid prospective college students in their search by offering insiders' views of selected colleges and universities, as expressed by current undergraduates or recent graduates who have exceptionally high academic ability. These students share a general bias in judging undergraduate education: they all have high expectations for a college or university's academic standards, its institutional and instructional flexibility, and its respect for nurturance of emerging talent. In this issue, we focus on the University of Michigan.

Note that the number of student reviewers is small. Consider their personal perspectives as only one component while you gather factual information and impressions from such other sources as college catalogs, site visits, talks with officials and students on campus, and the advice of your guidance counselor and teachers.

The University of Michigan

Our reviewers include eleven students, who major(ed) in chemistry/chemical engineering (1), computer science & engineering (2), English & communications (1), history (1), integrated premedical-medical studies (1), math (4), and philosophy (1). Students' comments appear within quotation marks.

Quality of Academic Instruction for Undergraduates

Our reviewers spoke very favorably of the quality of education at U of M. Several were students in one of three special programs: 1) the Honors program, a selective program that admits approximately 10% of the incoming class in the School of Literature & Arts; 2) the Residential College, which houses 700 undergraduates/year and was established to create a small college environment within the University; 3) the Inteflex Premedical-Medical Program, a combined B.S./M.D. program.

"Excellent. The Honors program allows students access to challenging classes and excellent instruction for the first two years. After that, one can take advanced seminars that allow close contact with faculty—both in one's own field of study and in others. The sheer number of courses is amazing: if I went there for twenty years, I do not think I would run out of courses to take."

"The quality of instruction is usually quite high. The Honors program takes very good care of its students; freshmen and sophomores are encouraged to take upper-level classes and to do research. There is also an Honors Independent Track, a sequence of Great Books & Classical Civilization Honors classes for freshmen and sophomores, and an extremely rigorous sequence of calculus and analysis for freshmen and sophomores. On the negative side, many of the upper level (non-Honors) classes are very easy—easier than Honors 100-level courses."

*"As you might expect, classes here are often **huge** (600-800). But lectures can be terrific, and much is also gained from discussion sections (approx. 20 students) led by graduate students. The profs are easily accessible in their office hours. The average grade around here in liberal arts seems to be a B. As are **striven for**, not **given**."*

"As a student in the Residential College, the opportunities are a little different. The classes are very small and personal. One of the primary goals of the RC is to develop near-fluency in a second language. The RC specializes in a more liberal curriculum, and the class on Russian film and the lab for holography are always full."

"In the Inteflex program, instruction is very good and many of our classes have only 15-20 students. U of M has a great TA system and offers great accessibility to profs."

"I have found professors to be very accessible, particularly in the sciences. Many are willing to work with students individually or in group review sessions, but the student must take the initiative. Undergraduate research opportunities are readily found."

"Undergraduate studies are not what made the University of Michigan the name it is today. Therefore, the undergrad is not treated with the utmost concern, particularly in core classes, which are generally taught in a way designed simply to get everybody through. Beyond the core courses, however, the quality of instruction is quite good. Professors are more eager to help in higher level courses in their area of interest."

"There are many fine libraries, which is good because so much information is available; but it's also bad in that you often have to go to several places to get your materials."

Social Life

Ann Arbor, a college town, is viewed by many as the cultural center of Michigan.

*"**Excellent** social life! A fantastic, lovely college town. Ann Arbor is the 'Paris of the Midwest'—lots of coffee shops, places to browse in bookstores, always stuff going on. People are **exceptionally** friendly, by and large. There are abundant opportunities to explore interests and a very diverse student body."*

"The social life is as diverse and vibrant as one might expect from a university of Michigan's size. Any club you might want to join will be represented there. The political groups are especially varied, addressing many issues from both a liberal and conservative viewpoint. I even managed to join one or two moderate ones. If you are interested in music, art, computers, sports, or just sitting around in coffee houses discussing philosophy, you will be able to find people who share your interest."

"If you like to party (and can maintain your grades at the same time), Ann Arbor is a great place. The city is intermixed with the University, making fast food, movies, dance clubs, and much more very accessible. If you would rather have peace and quiet, there are dorms that are away from it all. And if you like sports, Michigan has nationally-ranked teams in dozens of sports."

"Joining a sorority was a good decision. It gave me a chance to find a niche and develop leadership abilities. I highly recommend it!"

"Michigan is great. Ann Arbor is great; anyone who can't find something to do is just plain lazy."

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What Do You Like Least About the University of Michigan?

"First, the faculty. Many are outstanding. Don't deride a class because it's only lecture, lectures can be fascinating. And the profs are accessible; one scheduled a half-hour appointment with each student in his seminar just to get better acquainted with them. Second, Ann Arbor is a wonderful town with a little of everything—old houses, good restaurants, old and new movies, beautiful parks. I would enjoy living here even if I were not connected with the University."

"Being able to plan my own education with courses that I wanted. Despite being a math major, I took excellent classes on subjects ranging from existentialism to world political economics to Japanese to Primo Levi. I took a course on East Asia from one of the world's leading China experts, and my math courses were taught by some of the nation's best mathematicians. Perhaps the best course I took was one in which I administered a simulation of the Arab-Israeli conflict to a group of high school students from around the world via computer."

"The people are very friendly. There is little cut-throat competition except in some of the specialized programs. And U of M is strong in almost every academic discipline."

"I love the fact that I have met so many people from such diverse backgrounds. The school boasts a commitment to diversity and it definitely shows. I have friends who are conservative Republicans and flaming radicals. Meeting such different people has prompted me to examine my own ideas and values."

"The best thing about Michigan is at the end of four years you can come out having done more or less whatever you want, it prepares you to do whatever you want with the rest of your life."

What Do You Like Best About the University of Michigan?

Two reviewers noted that it can be easy to feel lost in a university with 18,000 undergraduates, and several commented that the academic advising is not always adequate, especially given the vast course offerings.

"Not winning the Rose Bowl more often? Seriously, the biggest drawback to Michigan is perhaps that it does not always receive the recognition as one of the top universities in the country, especially from people outside of the Midwest. Although one of the two best public universities, it doesn't quite have the 'name brand' appeal of an Ivy League school."

"I have been somewhat disappointed with the intellectual atmosphere at U of M. Although the Honors program is large and excellent, many of its students seem to be smart rather than intellectual—conversations outside of class revolve around sports, television, possibly community events, but rarely books or ideas."

UNIVERSITY OF MICHIGAN

Ann Arbor, MI 48109
(313) 764-7433

- 4-year coed state university.
- Campus in a college town.
- Full-time undergraduate enrollment 1993-94: approximately 18,750 men; 18,000 women.
- For information about the Honors program, (313) 747-4486; the Residential College, (313) 763-0176; the Inteflex Integrated Premedical-Medical Program, (313) 764-9534.

Who Would Be Most Compatible with the Academic and Social Atmosphere at the University of Michigan?

"Someone who can be responsible for his/her own academic career. You aren't thrown to the sharks; there are plenty of people willing to give you advice. On the other hand, nobody is going to stop you from taking classes that are too easy, classes that are too hard, or classes that are too narrow. If you need your education spoon-fed, you are probably better off going somewhere with a smaller curriculum."

"Someone who is able to do good work in a high-pressure environment, and who is independent and confident enough to ask for help when s/he needs it. Primary extracurricular interests should be politics, music, sports. Not too prejudiced; some of the students are, but Ann Arbor is a very liberal, diverse town, and students should not be appalled by either hippies or reactionaries."

*"Someone who is willing to **work** at being noticed. The professors here are not going to check up on you; they respect you as an adult. One does not have to love football to like it here."*

If You Had It To Do Over Again, Would You Go To the University of Michigan?

Nine reviewers said yes and two said probably.

*"I **wish** I had it to do over again, so that I could attend Michigan again. My final choice was between Michigan and Princeton. I decided that a bigger school would give me a wider range of opportunities and experiences. I was right. I'm sorry if I sound like I am writing a commercial for the University of Michigan, but I really love the place and would recommend it to almost anyone."*

*"**Yes!** There is so much to do here and so many people to meet. There is an outlet for every facet of yourself that you wish to explore. And Ann Arbor is beautiful and offers millions of social and cultural opportunities. There's no other place I'd rather be."*

"Yes! I love the fact that classes about sexism and racism are so easy to find—the University truly brings these concerns into just about every class (even science, sometimes). I feel like we are being schooled to build a new age. The challenge is exhilarating."

"Probably, but I'm not without regrets. I would have liked a more close-knit, intellectual community. I was on the verge of going to Princeton and decided not to because it was so expensive. The financial considerations are great; for in-state students with scholarships and jobs, U of M can be very cheap, and it's not hard to graduate in three years."

As you try to find the college or university best suited to you, the views of the University of Michigan presented above may be helpful. Keep in mind that these students might have had similar positive or negative experiences had they attended a different university. At any college, it is important for the individual student to seek out challenging academic experiences and the best professors, and to create a social life that best fits his or her personal style. ■

Note: The students quoted in the College Review Series are expressing their own views, which are not necessarily those of JHU or CTY.

CREATIVE MINDS ImaGiNe...

Submit your creative work—brain teasers, short stories/essays/book reviews. We look forward to hearing from you. Please write to *Imagine* • SET at CTY • The Johns Hopkins University • Baltimore, MD 21218.

TARANTELLA FOR THE '90s *by Charlene Ahn*

August 2, 1992: the second performance of the Governor's School West orchestra. The audience quiets. I wonder how many of them are starting to go to sleep, tired from relentless working, playing, and being told to open their minds ("If you open your mind too much, brains may fall out"), and I smile. We are playing the second movement of Symphony No. 1 by John Corigliano. A dry name, and one that doesn't seem to say very much, but we in the orchestra know what they don't, yet.

The piece is a tarantella, the wild dance done by those suffering from the spider's bite in the hope that the rapid movement would flush out the venom. (I hear Randy's voice in my mind: "It didn't work very well; they all died. But what else could they do?") Randy turns to us, smiling encouragingly and nervously. From my principal second violin seat right next to the conductor's podium, I can see his baton quiver, just a little. Then, we are all ready, and my sight focuses on the baton as it swings *down*—

And the piccolos scream: *"No, no!"* they shriek. *"No death, and if I have to die, let it not be like this, with the madness overtaking me!"* It is the cry of the AIDS victim for whom Corigliano writes in anger and grief, the cry of his friend who is going mad with periods of unbearably clear sanity. I am he; my fingers, driven higher than clarity of sound can reach, draw an agonizing screech from the complaining strings…suddenly, a quiet, stately dance in regular 6/8 meter…and then the loud jangling ear-splitting cacophony which slows, slows, and softens to virtual silence…. The horns wail. ("You have to sound sick, guys!" I remember Randy shouting in rehearsal.) And they *do*: I see the ends of Randy's mouth curve upwards, as if he is trying to restrain a delighted smile. And then we are growing louder, and faster, and here! is where the seconds come in again, good, I got it right, finally, it's stupid to be principal and still miss the entrance, and there is no time to think now because the madness is growing, growing, if we dance fast enough perhaps we will not die and I cannot hear myself above the horns and the trumpets and the piccolos shrieking above everything else the madness driving this massive organism that is the orchestra ever louder ever higher ever faster the poison is spreading and we are dancing faster and faster and—

And it ends. My damp hair is clinging to my head, and my hands are shaking spasmodically as they grip my violin tightly. I love this piece for the music in it and the story that Randy has lovingly told us (for if *we* love the music, *he* loves it even more than we can comprehend), but I hate it for the nervous wreck it makes of me every time we play it. Randy is standing rigidly still at the podium. There is the pause of a breathless instant, as we are all released from the spell of the AIDS victim's madness.

Then he turns. And the clapping begins. ■

Charlene Ahn graduated from the North Carolina School of Science and Math last spring. She is now a freshman at Harvard University, where she plans to concentrate in physics. Charlene was recently accepted into the Mozart Society Orchestra and the Harvard-Radcliffe Orchestra.

PUZZLE

Eleven-year-old **Tenie Remmel** lives in San Diego, California, and is being home-schooled. He is studying college-level mathematics and science, enjoys computer programming, and is working on a packet of games for publication. Tenie also participates in gymnastics and competes on a swim team.

0	2	7	7	2	2	5	8
7	4	3	5	5	4	2	0
6	0	6	0	5	6	6	7
6	5	1	A1	5	3	7	8
2	4	6	5	3	4	6	3
1	3	4	4	5	6	A2	2
0	7	5	0	3	4	7	7
1	9	7	1	5	3	6	4

Start

4

4	A2	7	7	7	3	2	2
2	6	0	6	6	4	0	7
1	2	3	2	4	6	3	6
4	2	2	5	5	4	1	3
0	3	1	1	3	1	1	4
3	4	4	5	3	4	4	3
1	8	0	2	2	3	5	2
6	1	A1	7	3	1	0	5

Finish

Directions:

1) The number in each square indicates the number of squares to jump in your next move. You may move up, down, left, or right.
2) Each move **must** travel a straight line; you cannot make dogleg moves.
3) Ignore the numbers in the squares that you **jump on**; numbers are relevant only in the quares that you **land on**.
4) You may **jump on**—but cannot **land on**—the squares (enclosed by dotted lines) that lie between the Start and Finish squares and the main boards. These squares do, however, count in computing jumps.
5) Squares A1 and A2 are airports. If you **land on** an airport, fly to the airport with the same name on the other board, then move one square in any direction.

Hints: Beware of **0** squares; they are traps. So are squares **8** and up.

VOLUME 2 • NUMBER 3

ImaGiNe

Opportunities and Resources for Academically Talented Youth

Mark Your Calendar **2**

Some (Other) Great Ways to Spend Your Summer **3**

Regional Talent Search Summer Programs **4**

Why Spend Part of Your Summer Back in the Classroom? **5**

Other Talent Search-Type Summer Programs **6**

Mathematics **8**

Science **9**

Humanities **10**

Penn Summer Academy in Communication Studies **12**

National Journalism Scholars Academy **13**

Study Abroad **14**

Arts **16**

Looking for a Challenge? Try a College Course **17**

Fascinating Classics: Jane Eyre **18**

If Classrooms Ran as Football Teams Run **20**

The Coach's Corner **21**

Students Review Amherst College **22**

Creative Minds Imagine **24**

Spotlight On

ACADEMIC SUMMER PROGRAMS

CTY students in Dr. Cynthia Domack's paleobiology class search for fossils while on a field trip near Hamilton College in Clinton, New York.

Photo by Vilma Lonsdale

Midwinter. Temperatures fall uncomfortably low, and days seem to end too early with the setting sun. Time to hibernate and think longingly about the adventures of summer past. Time to make plans to transform your fantasy for next summer into reality.

Picture yourself with others your own age on a college campus, living in a dormitory, studying in a shaded quad, gathering in the dining hall. Mornings and early afternoons are spent taking challenging courses on topics of your choice. Classes, led by an instructor and TA, are small—perhaps fifteen students, all of whom are as turned on by learning as you are. The depth and pace of the discussions, both in and out of class, stimulate your intellectual imagination.

Time to relax? That, too, of course. Recreational activities, field trips, talent shows. "Mandatory fun." Then back to the books for study hall.

In this issue, we offer only a sampling of the variety of such summer programs available to academically talented students—enough, we hope, to whet your appetite and start you searching for more. ■

Note: All summer programs mentioned in this issue offer some need-based financial aid. A few competitive award programs are free, and other programs with subsidized fees include those that are state sponsored and the NSF Young Scholars programs (see pages 8-9).

Mark Your Calendar

Below are February-May registration deadlines for some well-known national academic competitions in the humanities, sciences, and mathematics.

DEADLINE	COMPETITION
February 5	**Quill & Scroll Society International Writing and Photography Contest** (Individuals enter; grades 7-12): School of Journalism, University of Iowa, Iowa City, IA 52242; (319) 335-5795.
Feb. 6-Mar. 18	**JETS-TEAMS Competition** (Schools enter one varsity and multiple jr. varsity teams; grades 9-12; call for local registration deadline): Daniel Eagle Eye, Junior Engineering Technical Society, 1420 King Street, Alexandria, VA 22314-2794; (703) 548-5387.
February 9	**USA Computing Olympiad** Qualifying Round (Individuals enter through local coordinator): Dr. Donald Piele, University of Wisconsin-Parkside, P.O. Box 085664, Racine, WI 53408; (414) 634-0868; e-mail: piele@cs.uwp.edu
February 10	**National Academic Team Challenge** (Mathematics) (Schools enter multiple teams; grades 9-12): Foundation for Scholastic Advancement, P.O. Box 3340, Iowa City, IA 52244; (312) 464-4812.
February 20	**National Federation of Press Women High School Journalism Contest** (Individuals enter; grades 9-12): NFPW Headquarters Office, P.O. Box 99, Blue Springs, MO 64013; (816) 229-1666.
March 3	**National Academic Team Challenge** (Biology, Chemistry, Physics) (Schools enter multiple teams; grades 9-12): Foundation for Scholastic Advancement, P.O. Box 3340, Iowa City, IA 52244; (312) 464-4812.
March 10	**Knowledge Master Open** (Schools enter one team; grades 5 & 6): Academic Hallmarks, Box 998, Durango, CO 81302; (800) 321-9218. *[See also Apr. 19.]*
April 1	**International Computer Problem Solving Challenge** (Individuals enter through local coordinator; grades 4-12): Dr. Donald Piele, University of Wisconsin-Parkside, P.O. Box 085664, Racine, WI 53408; (414) 634-0868; e-mail: piele@cs.uwp.edu
April 19	**Knowledge Master Open** (Schools enter one team; grades 7-12): Academic Hallmarks, Box 998, Durango, CO 81302; (800) 321-9218.
late April	**American Regions Math League** (Teams register; grades 7-12): Mark E. Saul, ARML President, 711 Amsterdam Avenue, New York, NY 10025; (212) 666-5188.
May 1	**Texaco Star National Academic Championship** (To enter, teams must have won regional or state competition of 16 schools; grades 9-12): Chip Beall, Executive Director, 8334 Breckenridge Way, Columbus, OH 43235; (614) 848-5113.
May 15	**USA Mathematical Talent Search (USAMTS)** (Individuals enter for '95-'96 school year): Dr. George Berzsenyi, Department of Mathematics, Box 121, Rose-Hulman Institute of Technology, Terre Haute, IN 47803; (812) 877-8474/8391.

Aspiring Writers, Take Note

Much to the delight of our editorial staff, articles contributed by students fill this issue of *Imagine*. First-hand accounts like these add interest to program descriptions of all kinds. If you have enjoyed an academic/related experience that you'd recommend to our readers, consider writing it up.

In particular, our focus topics for the next two issues are **Science & Technology** (March/April) and **Foreign Languages & Study Abroad** (May/June). Any thoughts on these subjects? If so, *please get in touch soon!* And don't forget items for Creative Minds Imagine and the Mailbag.

Imagine...
*Opportunities and Resources for Academically Talented Youth**

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SET Director • Linda E. Brody, Ed.D.
Research Associate • Carol C. Blackburn, Ph.D.
Staff Writer/Editor • Susan B. Hellerman
Staff Writer • Lesley Mackay
Contributing Writer • Charles Beckman
Administrative Assistant • Patricia A. Wade
Designer, JHU Press • Lesli M. Lai

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The Johns Hopkins University Press
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Toll-free: (800) 548-1784

Address editorial correspondence to:
Susan B. Hellerman
SET at CTY
The Johns Hopkins University
Baltimore, Maryland 21218
Phone: (410) 516-0309 • FAX: (410) 516-0108
E-mail: setcty@jhunix.hcf.jhu.edu

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Some (Other) Great Ways to Spend Your Summer

Although much of this issue of *Imagine* describes selected courses for talented students, your options for filling the precious days of summer with worthwhile activities are certainly not limited to academics.

You may set aside time to travel with family or friends, enjoy the physical and mental rewards of sports, or even just soak up some rays. Jobs—paid or unpaid—are another summer tradition: a "job" might mean flipping burgers to build up your bank account or, as these two authors describe, trying out future careers as a volunteer.

Exploring Career Options—as a Research Intern

by Louise Siddons

Three years ago, when I was in 9th grade, I became interested in scientific research. So my father suggested that I explore the volunteer opportunities available through the Science Education office at Brookhaven National Laboratory in Upton, New York.

After various experiences in several departments, I became involved in a Medical Department research project on the use of tumor-specific drugs which, upon photoactivation, kill the tumor cells to which they are bound. I recently completed experiments to confirm the intracellular location where the drugs bind and am continuing this research as new breakthroughs are made in the experimental technique. I also help teach lab techniques to new student workers and participate in lab maintenance, including animal work.

Since I spend about forty hours a week during the summer and up to twelve hours a week during the school year in the lab, this valuable career internship has become a major extracurricular activity. I not only have seen medical labs but have been involved with many other departments on site, including chemistry, biology, and x-ray physics. This experience has helped me to understand what a career in scientific research would be like, and I plan to major in cell biology when I go to college next year.

My research at Brookhaven has enriched my academic life and provided me with many wonderful experiences, friends, and accomplishments. In addition to the laboratory skills I have gained, my work has also taught me about responsibility, group dynamics, and cooperation. It has enhanced my future in many ways, not only providing an impressive résumé item for college and job applications, but also giving me a direction and goals that I can now strive to attain. ■

For information on the Brookhaven program, call (516) 282-2123 and ask for the Science Education office. To locate other internships and programs in science, mathematics, and engineering throughout the U.S. and abroad:

Directory of Student Science Training Programs for Precollege Students
Available from Science Service, Inc., 1719 N Street, NW, Washington, DC 20036; (202) 785-2255.

*In addition to her interest in science, **Louise Siddons** also enjoys painting (both Chinese and acrylics). Louise lives on Long Island and is a senior at Shoreham-Wading River High School, where she works on the yearbook and last year was named the Outstanding Underclassman in Science.*

Exploring Career Options—Backstage *by Jennifer E. Lane*

This past summer I chose not to attend one of the usual academic summer programs designed for gifted students, but rather to spend my time volunteering in theater.

I think I would eventually like to design costumes for theater. So I went to the Green Mountain Guild, which produces six musical plays during the summer at the Killington Playhouse, and offered my services to the costume department.

It was a good experience in several ways. I got to spend my summer doing something I really enjoyed, and at the same time I learned what I could expect to be doing in a career as a designer. I helped with basic hand and machine sewing, dyeing, and finding outfits to fit particular actors. It really gave me a thrill to see the shows later and recognize things that I had helped to find or make, especially when I discovered that the shows' designer had actually used an idea I'd had for one of the costumes.

Now, something tells me that most of you are not thinking of going into theater as a profession. But there are good things about volunteering, no matter what kind of work you do. You not only get to help somebody else at their work, but you can see what it would be like doing a similar job for a living, day in and day out.

There's a certain satisfaction in doing something that makes a difference and knowing that you can really contribute to the adult world. I wholeheartedly recommend volunteering as an equally viable alternative to purely academic experiences, especially for older students who are starting to plan for life after high school. ■

"There are good things about volunteering, no matter what kind of work you do…a certain satisfaction in doing something that makes a difference and knowing that you can really contribute to the adult world."

Community service—whether locally or farther afield, during the summer and year-round—is another kind of volunteer work that reaps terrific personal rewards, especially the satisfaction you gain from simply helping someone else. Opportunities abound, from grocery shopping for your elderly neighbor to rebuilding flood-damaged houses in the Midwest to immunizing children in underdeveloped countries.

To learn about ways *you* can make a difference:

- **Locally**—Get in touch with religious or other local groups that sponsor community services such as soup kitchens or home repairs.
- **Nationally and/or Internationally**—Take a look at some of the larger organizations, including

Habitat for Humanity International, *121 Habitat Street, Americus, GA 31709-3498; (912) 924-6935; fax (912) 924-6541*

Amigos de las Americas, *5618 Star Lane, Houston, TX 77057-9927; (800) 231-7796 or (713) 782-5290.*

***Jennifer Lane**'s interest in the arts has also led to her involvement in school band, chorus, and drama club, as well as in her church's handbell choir. Jen has participated in All-State and New England Music Festivals and the regional One-Act Drama Festival.*

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Regional Talent Search Summer Programs

What's a Talent Search?

The practice of conducting systematic searches for students who reason extremely well mathematically and/or verbally was begun by Professor Julian Stanley of The Johns Hopkins University in the early 1970s. Giving a difficult test such as the SAT to middle-school students, who are much younger than the college-bound seniors for whom it was designed, results in scores that point up differences among bright students who all score well on in-grade tests.

Today, about 150,000 7th and 8th graders participate annually in talent searches, and the concept has expanded to include testing for younger students as well. Regional talent searches that encompass areas of the United States are conducted by The Johns Hopkins University, Duke University, Northwestern University, and the University of Denver. State and local talent searches have developed as well, such as the Iowa Talent Search conducted by Iowa State University.

What If I Score Well?

Academic summer programs are among the services available to students who score exceptionally well on these out-of-level tests. Believing that such students benefit from advanced coursework in their area of strength, talent searches offer acceleration and enrichment options in the humanities, mathematics, and the sciences. Some programs include Advanced Placement and college-level courses as well.

Summer programs offered by the four regional talent searches are listed on this page; selected summer programs offered by other universities that have adopted the Johns Hopkins talent search model appear on pages 6 and 7. Some of these other programs work in cooperation with one of the regional talent searches, while others have their own vehicle for identifying students. In general, qualifying students may apply to any of these programs on a space-available basis, although centers may give priority to their own talent search participants. *All of these programs offer some need-based financial aid.*

Typically, students choose one fast-paced course which meets five hours a day, five days a week, with a class size of 15-20 students. Instructors are outstanding university faculty, secondary teachers, and graduate students. Those who select residential programs are housed in university dormitories with excellent supervision and also participate in cultural/recreational activities.

Many of these programs register students on a first-come, first-served basis, so some courses may fill before the official deadline. Request brochures from individual programs to learn about the wide variety of course options. ■

Duke TIP: Duke University Talent Identification Program, Durham, North Carolina

See also Science and Study Abroad

Options: **Grades 7-10,** three-week residential
Sites: Duke University campuses, Davidson College, Duke University Marine Lab, and Texas A & M Marine Lab
Dates: Between June 14-August 13
Fee: From $1,830
Deadline: May 1

Terri Williams, Admissions Officer, Duke University Talent Identification Program, Box 90747, Durham, NC 27708-0747; (919) 684-3847; fax (919) 681-7921.

CTY: Center for Talented Youth, The Johns Hopkins University, Baltimore, Maryland

See also Study Abroad

Options: **Grades 2-6,** three-week commuter; **grades 5 & 6** and **grades 7-10,** three-week residential and commuter *(Commuter option for grades 7-10 is available only on JHU campus.)*
Sites: **Grades 2-6:** Episcopal High School, Alexandria, VA; Garrison Forest School, Owings Mills, MD; Sandy Spring Friends School, Sandy Spring, MD
Grades 5-6: Goucher College, Baltimore, MD; Connecticut College, New London, CT; Loyola Marymount University, Los Angeles, CA
Grades 7-10: Franklin & Marshall College, Lancaster, PA; Dickinson College, Carlisle, PA; Hamilton College, Clinton, NY; Skidmore College, Saratoga Springs, NY; Loyola Marymount University, Los Angeles, CA; and The Johns Hopkins University, Baltimore, MD
Dates: June 25-July 14; July 16-August 5
Fee: $1,750 (residential); $795 (commuter)
Deadline: April 8

Academic Summer Programs, CTY, The Johns Hopkins University, Baltimore, MD 21218; (410) 516-0337; fax (410) 516-0804.

CTD: Center for Talent Development, Northwestern University, Evanston, Illinois

Options: **Grades 5 & 6,** Apogee; **grades 7-9,** Spectrum; **grades 10 & 11,** Equinox AP; and **grades 10-12,** Solstice & Academy; three-week residential and commuter
Dates: June 25-July 15/July 23-August 12 (Apogee/Spectrum); June 25-July 15 (Equinox); July 23-August 12 (Solstice/Academy)
Fee: $1,700 (residential); $850 (Spectrum/Equinox commuter); $925 (Apogee/Solstice/Academy commuter)
Deadline: May 15 (Spectrum/Equinox/Solstice); **May 31** (Apogee)

Dr. Paula Olszewski-Kubilius, Center for Talent Development, Northwestern University, 617 Dartmouth Place, Evanston, IL 60208; (708) 491-3782; fax (708) 467-4CTD.

Rocky Mountain Talent Search Summer Institute, University of Denver, Colorado

Options: **Ages 10-15,** two-week commuter; **ages 12-16,** three-week commuter and residential
Dates: June 12-23 (two-week commuter); July 9-29 (three-week commuter and residential)
Fee: $250 for one class, $425 for two classes (two-week commuter); $375 for one class, $675 for two classes (three-week commuter); $1,495 est. (three-week residential)
Deadline: May 21

Rich Radcliffe, Director, Rocky Mountain Talent Search, University of Denver, Wesley Hall Room 203, 2135 East Wesley Avenue, Denver, CO 80208; (303) 871-2983; fax (303) 871-3422.

I learned so many things by taking CTY's Writing Skills II. When I first started the writing classes, my essays were pointless, cliché-ridden, and in desperate need of revision. At CTY I learned to develop a thesis, use colorful language, compare and contrast, construct arguments…the list is endless.

But more than about any writing technique, I learned about achievement.

Everyone who comes to CTY is used to being the class intellectual, used to being called "The Brain" or "Einstein." Even if being known only in terms of one adjective—smart—is restricting, there is a certain comfort in it.

The first few days of CTY are something of a shock. Everyone, it seems, is devastatingly intelligent, amazingly well read, and sparklingly witty. The desire to slink back home and go to Girl Scout camp instead is overpowering.

After the first few days, though, the insecurities subside. The atmosphere becomes incredibly exciting rather than threatening. Contemporary fiction is discussed at lunch, and anyone who hasn't read the book in question is constantly encouraged to. Concerns about abortion rights and Central America are discussed at dinner, and everyone is expected to be knowledgeable about these and other current issues. One is constantly exhorted to have an opinion. A reasoned, well-thought-out opinion. An opinion about everything: art, books, politics, movies, music.

This attitude of intellectual curiosity naturally spills over into discussions about classwork. There is always someone ready to critique an essay or help develop a thesis. There is always someone ready to say, "That's good, but you could do even better."

So, in a strange way, the other students help immeasurably by being both friend and foe. Because they are so intelligent, one has to be at least equally so, if only to stay even. Yet they also help by being supportive, inspiring friends. Taken together, the two roles do much to improve the quality of work done at CTY.

Another thing that improves the quality of work is the fact that no grades are given. It becomes very difficult to gauge one's progress. The teachers *don't* critique less as the writing improves. Without grades there is no way to say, "This is so hard to write, I'll hope for a *C+*"; no way to aim for anything but perfection.

Instead of grades, we receive minutely detailed critiques. This more than anything else creates an atmosphere of striving. Nothing is ever marked "perfect" or "100%"—not on the first draft; not on the ninth. Everything that is turned in is marked with corrections and suggestions for revision. I never met anyone who found this frustrating, even though it has incredible potential to be so. The comments are always so correct, so right, that it is impossible to feel defensive about them. The teachers are able to take the most unpromising essay and critique it until even the disgusted author is enthusiastic about it. That is the way critiquing inspires, making one see how an essay can be made infinitely better, the same essay that is considered to be perfect, right down to punctuation, or is thought to be impossible to write.

These three things—the other students, the lack of grades, and the critiques—taught me CTY's most important lesson: I learned to strive.

In school, things have always come easily, with no real effort at all. A parroting back of facts is considered insight; a grammatically correct paragraph is seen as literary genius. I have always done what is expected of me—only at school the expectations are ridiculously low.

When I first went to CTY, it was the first time that I'd had to work for something. Suddenly, the "challenges" were challenging and the "demands" demanding. It was hard, and a few times I failed, but I learned. For the first time in my life, I learned, not only about writing, but about working.

I learned that getting up after only five hours of sleep was worthwhile because the revised essay came closer to what I wanted. I learned that having the class "workshop" my essay—and completely tear it apart—wasn't all bad; it did help me improve the essay. I learned that I wasn't as proud of the essays I was able to dash off quickly as I was of the ones I struggled over, even if the easy essay was better. I learned to respect only the knowledge that I had worked for.

To work, to struggle, to strive. This is something far more important than writing technique, something I will be able to use for the rest of my life, no matter what I choose to do—something I might not have learned without CTY.

I have many diverse interests in school, from French to biology to English, that in turn lead to an equally diverse set of career interests, from being a diplomat to being a research psychologist—interests that are so diverse that I couldn't possibly begin to pick one as my career aspiration. I do hope that, whichever I pick, the things I've learned at CTY will continue to help me. ■

This review of one of CTY's academic summer courses—while descriptive of current offerings—is actually a walk down Memory Lane. The essay won first place for humanities in the Orville and Irene Anderson Excellence Awards for Young Scholars competition in 1985 when its author was 14 years old. Readers of *Imagine* will remember Amanda's byline on several articles in previous issues. We recently asked her to update her evaluation of CTY programs:

"Nine years have passed since I wrote this essay, and everything I learned at CTY has in fact been valuable to me academically. And now I've finally figured out what my "career aspirations" are: I'm currently in my first year of a graduate program in English and hope eventually to teach at the college level. Last summer I returned to CTY as a writing instructor and was delighted to discover that the atmosphere for today's students is still as challenging and exciting as ever." — Amanda Claybaugh, 1994

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Other Talent Search-Type Summer Programs

Programs listed on these two pages are patterned after the regional talent search model. Some run their own local or statewide talent searches; others are affiliated with, and draw participants from, one of the four organizations listed on page 4. Like the regional talent searches, these programs offer acceleration and enrichment options in the humanities, mathematics, and the sciences.

Again, many programs accept registrations on a first-come, first-served basis. Call or write for specific course offerings. Some need-based financial aid is available.

ADVANCE Program for Young Scholars, Northwestern State University, Natchitoches, Louisiana*

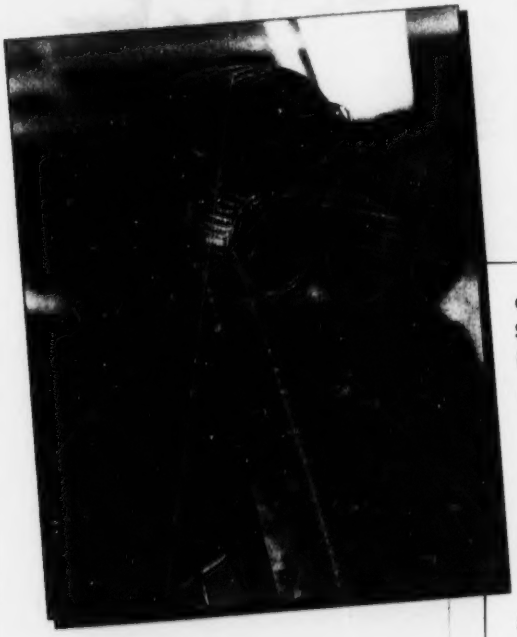
Options: **Grades 7-11,** three-week residential
Dates: June 4-24
Fee: $880 (Louisiana residents); $1,305 (out-of-state)
Deadline: **May 15**

Leslie Ann Gregory, Assistant Director, Programs for the Gifted and Talented, Northwestern State University, P.O. 5671, Natchitoches, LA 71497; (800) 259-4438 (within LA); (318) 357-4500; (in state only); fax 318-357-4547.

ATS: The Academic Talent Search and Accelerated College Entrance Center, California State University, Sacramento, California

Options: **Grades 6-9,** three- or six-week commuter
Dates: June 26-August 4
Fee: $130-250 per course
Deadline: **May 1**

Dr. Terry Thomas, Director, ATS, CSU Sacramento, 6000 J Street, Sacramento, CA 95819-6098; (916) 278-7032; fax (916) 278-5930.



Photos by Vilma Lonsdale

Carnegie Mellon University Summer Programs, Pittsburgh, Pennsylvania

Options: **Grades 3-6,** C-MITES, two-week commuter, mathematics and science
Sites: Pittsburgh and Kennett Square, PA
Dates: Sessions in June and July
Fee: $175
Deadline: **May 15**

Investigation of Talented Elementary Students, 227C Student Center, Carnegie Mellon University, Pittsburgh, PA 15213; (412) 268-1629.

The Connie Belin National Center for Gifted Education, The University of Iowa, Iowa City, Iowa

Options: **Grades 6-9,** BESTS: Belin Elementary Student Talent Search, one- or two-week residential
Dates: June 18-23; June 25-30
Fee: $375 per session
Deadline: BESTS members will receive information in February and March.

The Connie Belin National Center for Gifted Education, 210 Lindquist Center, The University of Iowa, Iowa City, IA 52242; (319) 335-6148 or (800) 336-6463; fax (319) 335-5151.

CAP: Center for Academic Precocity, Arizona State University, Tempe, Arizona

Options: **Pre-kindergarten through grade 11,** five-week commuter; **grades 5 & 6,** three-week residential; **grades 7-11,** five-week residential
Dates: July 3-August 4 (five-week commuter); July 1-22 (three-week residential); July 1-August 5 (five-week residential)
Fee: $325 per commuter course; $1,275 (three-week residential); $2,025 (five-week residential)
Deadline: **April 29**

Dr. Eleanor Jordan, Director, CAP, Arizona State University, Box 872711, Tempe, AZ 85287-2711; (602) 965-4757; fax (602) 965-1069.

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The Center for Gifted Studies, University of Southern Mississippi, Hattiesburg, Mississippi*

Options: **Grades 7-10,** three-week residential
Dates: July 9-28
Fee: $975 (for all participants)
Deadline: **April 30**

Dr. Frances A. Karnes, The Center for Gifted Studies, University of Southern Mississippi, Box 8207, Hattiesburg, MS 39406-8207; (601) 266-5236; fax (601) 266-4978.

Purdue University Gifted Education Resource Institute, West Lafayette, Indiana

Options: **Grades 4-6,** Comet, one-week residential; **grades 6-8 and 9-12,** Star/Pulsar (two courses each), two-week residential
Dates: Between June 18-July 8 (Comet); June 18-July 1 and July 2-15 (Star); July 9-22 (Pulsar)
Fee: $520 est. (Comet); $925 est. (Star/Pulsar)
Deadline: **June 1**

Summer Residential Programs, Purdue University, 1446 LAEB, West Lafayette, IN 47907-1446; (317) 494-7243; fax (317) 494-4175.

WCATY: Wisconsin Center for Academically Talented Youth, Madison, Wisconsin

Options: **Grades 5 & 6,** Young Students, one-week residential; **grades 7-10,** Accelerated Learning, three-week residential; **grades 11 & 12,** Senior, three-week residential
Sites: Beloit College (YS); University of Wisconsin-Eau Claire (AL); University of Wisconsin-Madison (SR)
Dates: July 30-August 5 (YS); July 9-29 (AL); June 11-30 (SR)
Fee: $500 (YS); $1,320 for Wisconsin residents and $1,700 for out-of-state residents (AL); $1,350 for Wisconsin residents; for out-of-state fee, please call (SR). (Aid available to state residents.)
Deadline: **April 28** (YS/AL); **April 7** (SR)

Dr. Ellie Schatz (for AL) or Deborah Katz Hunt (for YS/Senior), WCATY, Suite 120, 8017 Excelsior Drive, Madison, WI 53717; (608) 271-1617; fax (608) 271-1617.

OPPTAG: Office of Precollegiate Programs for Talented and Gifted, Iowa State University, Ames, Iowa

Options: **Grades 7-9,** Explorations, one-week residential program; **grades 7-10,** CY-TAG: Challenges for Youth-Talented and Gifted, three-week residential
Dates: Between June 18-July 29 (Explorations); June 17-July 8 and July 15-August 5 (CY-TAG)
Fee: $415 (Explorations); $1,050 (CY-TAG)
Deadline: **April 14**

Keith Davis, Program Coordinator, OPPTAG, W172 Lagomarcino Hall, Iowa State University, Ames, IA 50011-3810; (515) 294-1772; fax (515) 294-6424.

Summer Stretch, Halbert Robinson Center for the Study of Capable Youth, University of Washington, Seattle, Washington

Options: **Grades 5 & 6,** three-week commuter; **grades 7-9,** five-week commuter
Dates: June 26-July 13; June 26-July 28
Fee: $345 (three weeks); $450 (five weeks)
Deadline: First come, first served

Summer Stretch, Halbert Robinson Center for the Study of Capable Youth, University of Washington, NI-20, Seattle, WA 98195; (206) 543-4160.

Western Kentucky University Summer Program for Verbally and Mathematically Precocious Youth, Bowling Green, Kentucky*

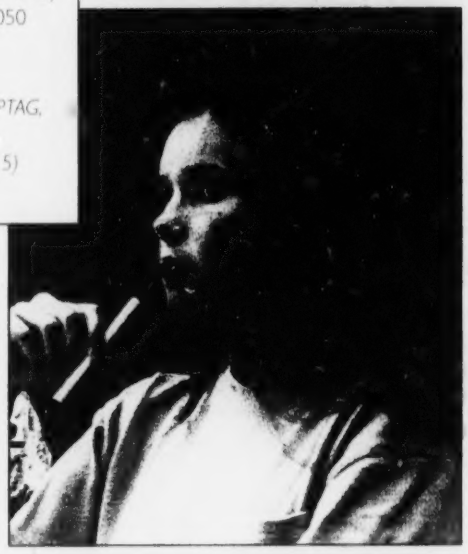
Options: **Grades 7-10,** three-week residential
Dates: July 2-22
Fee: $1,200 est. (aid available to state residents)
Deadline: First come, first served

Dr. Julia Roberts, The Center for Gifted Studies, Western Kentucky University, Big Red Way, Bowling Green, Kentucky 42101-3576; (502) 745-6323; fax (502) 745-6470.

SMU/TAG: Program for Talented and Gifted Students, Southern Methodist University, Dallas, Texas*

Options: **Grades 7-9,** three-week residential and commuter
Dates: June 11-30, July 9-28
Fee: $1,850
Deadline: First come, first served

Dr. Kathy Hargrove, Director, SMU/TAG, P.O. Box 750383, Dallas, TX 75275-0383; (214) 768-5437.



Academic summer programs selected for this issue of *Imagine* represent only a few of the options available to talented students across the country. For additional information, consult these guides:

Educational Opportunity Guide: A Directory of Programs for the Gifted (240+ pp., $15) Order from Duke University Talent Identification Program, P.O. Box 90747, Durham, NC 27708-0747; (919) 683-1400; fax (919) 683-1742.

Program Opportunities for Academically Talented Students Over 450 programs throughout the U.S. and abroad (100+ pp., $13.50 includes shipping and handling). Order from the Center for Talented Youth, The Johns Hopkins University, 3400 No. Charles Street, Baltimore, MD 21218; (410) 516-0116; fax (410) 516-0108.

**** Offered in cooperation with the Duke University Talent Identification Program, each of these programs assumes full responsibility for its own instruction, administration, and outcomes.***

MATHEMATICS

For more math course options, check out Talent Search programs.

PROMYS

by Miriam Rocke

I have always loved math. For a long time, however, I couldn't find anyone else who felt quite the same way. Then I discovered the Program in Mathematics for Young Scientists, a six-week summer math "camp" at Boston University. The idea of a math camp sounded intriguing to me, so I applied and was accepted. (Everyone else thought I was crazy for voluntarily going to a summer math camp.)

PROMYS *was* really intense. Every day we had a lecture in the morning and got our problem set for the day. The rest of the day had very little structure except for the other classes, such as combinatorics and fractals for the second- and third-year students, and discussion sections for the first-year students like me. We were supposed to work on the problem set the rest of the time.

PROMYS was similar to college. It was intellectually stimulating; the material was challenging, and I like being challenged. I also learned how to analyze and solve problems more easily.

More than that, though, the atmosphere of the whole program was what truly made it so exciting. I had studied math on my own before, skipping from Geometry to Introductory Analysis and doing Algebra II/Trig over one summer, but I didn't get as much of a high from that. I loved being with people who were intelligent and enthusiastic about math. There were several people there whose minds worked at the same pace as mine, which made studying fun. Working with those people and having intellectual discussions (even at 2 in the morning) were experiences I will never forget. ■

Miriam Rocke, *16, is a senior at Davis Senior High School and also studies math and physics at the University of California-Davis.*

PROMYS

Options: Grades 9-11, six weeks
Dates: July 2-August 12
Fee: $1,300 (est.) plus $100 books
Applications accepted: March 1-June 1

Professor Glenn Stevens, Director, PROMYS, Department of Mathematics, Boston University, 111 Cummington Street, Boston, MA 02215; (617) 353-2563.

ROSS YOUNG SCHOLARS PROGRAM

by Megumi Harada

How should one begin to describe eight weeks at the Ross Young Scholars Program? We have suffered, lost much sleep, and wandered the halls in the wee hours of the morning, frustrated enough to attack on sight anyone who might dare say, "Oh, that problem is so *easy*." Very well, then. I have learned much about mathematics, but more about what learning is, in general.

Here in this secluded setting, I have acquired precious skills: to concentrate on my studies on my own; to choose to explore, among many possible paths, some that interest or concern me; to take joy from what little discoveries I may make on my own; and, if such a need may arise, to share with others what little knowledge I have.

As an experience of intense study and nonstop bombardment of ideas, certainly this summer must be precious. What I have learned is useful not only to someone studying mathematics, but to anyone who would care to turn a curious and serious eye on the world. Anyone who goes through this program and manages not to be completely overwhelmed achieves something quite un-mathematical: to hold one's own. ■

Megumi Harada *wrote this essay while attending the Ross program three summers ago, following her graduation from high school. She is now majoring in physics at Harvard and believes that her Ross experience helped enable her to take full advantage of the academic challenges there.*

Ross Young Scholars Program

Options: Ages 14-17, eight weeks
Dates: June 18-August 12
Fee: $1,295-$1,420
Deadline: May 15

Professor Arnold E. Ross, Department of Mathematics, The Ohio State University, 231 W. 18th Avenue, Columbus, OH 43210; (614) 292-1569; fax (614) 292-1479.

YOUNG SCHOLARS PROGRAM, ROSE-HULMAN INSTITUTE OF TECHNOLOGY

by Peter Kim

While attending the Young Scholars Program at the Rose-Hulman Institute of Technology, I finally had the chance to liberate my mind to explore mathematical topics from different angles.

The majority of the program involved a group research project. First, we selected topics that attracted us and then formed groups according to our choices. Our advisors gave us room to explore freely. Every night we combined our individual results with those of other group members; this mathematical discussion enhanced our individual potential and ability, and our friendships.

Classes in problem solving, set theory, and graph theory gradually improved our skills with new strategies and techniques. We also were introduced to local scientists and mathematicians who exposed us to practical and research issues.

Local trips and parties at professors' houses made us feel more comfortable and closer personally. Before I had a chance to feel homesick, it was time to pack. In retrospect, I find that my mathematical understanding and problem solving skills improved because of this program even more than I had realized. ■

Mathematical problem solving has long been an avid interest of ***Peter Kim****'s. Now in 10th grade, Peter also enjoys swimming, tennis, and tae kwon do.*

Young Scholars Program, Rose-Hulman Institute of Technology

Options: Grades 8-11, four weeks
Dates: July 16-August 12
Fee: $650
Deadline: April 15

Dr. George Berzsenyi, Department of Mathematics, Box 121, Rose-Hulman Institute of Technology, Terre Haute, IN 47803; (812) 877-8474; fax (812) 877-3198.

9 SCIENCE

For information on a wide variety of science course options, refer to Talent Search programs.

DUKE UNIVERSITY TIP MARINE LAB, PIVER'S ISLAND

by Brian Shillinglaw

From the brochure information, it seems that Duke TIP's Marine Lab program varies little from any other gifted camp. Yes, you get to interact with other students like yourself, study under accomplished and knowledgeable teachers, and be challenged more than you ever are in your school year. It almost seems that nothing separates this particular summer program from the pack.

Almost.

Your impressions upon arrival, however, are a different matter. Everything seems incongruous with your previous experiences at gifted programs: the dorm, which houses all the TIPsters at this site, holds only 48 people; you have a shower in your room—a luxury; the food is excellent(!), courtesy of the resident culinary genius, Sly; beauty surrounds you, as the Marine Lab is situated on the point of tiny Piver's Island, so the sea is never more than thirty yards away.... You spend time wandering about the island, enjoying a sunset, or watching bottlenosed dolphins near the seawall. You begin to harbor a sneaking suspicion that you are actually in the wrong camp.

Duke TIP's Marine Lab program, however, is definitely the *right* camp.

The island library holds an impressive number of scientific abstracts and journals and is connected by computer to all the Duke libraries.

The Marine Lab program offers three courses: Behavioral Ecology, Coastal Ecology, and Physiological Ecology. All are field oriented, so you spend as much time out in nearby islands digging through the mud or observing feral ponies as you do in the lab. Field trip destinations range from nearby National Maritime Forest to Shackleford Banks, a small isle in the outer reaches of the barrier islands.

All three Marine Lab courses require students to do an original experiment in the final week. This year's experiments covered a wide range of topics, from "The Effects of Sewage-Related Fertilizers on Anaerobic Protozoan" to "Social Behavior in Atlantic Bottlenose Dolphins."

Libraries, courses, experiments—all of these are important, but none of them comes close to the real draw of the camp: its size. During the '94 session, the Marine Lab admitted only 37 students. *37.* This, of course, means smaller classes; moreover, you know *everyone* at the Marine Lab within the first week.

If you like the atmosphere at larger camps, consider the Marine Lab with a jaundiced eye. However, if you enjoy a more peaceful, more personal ambiance, write Duke TIP without delay. And if you do go to the Marine Lab this summer, please give my regards to Sly. ■

***Brian Shillinglaw** enjoys writing, singing, backpacking, playing soccer,*

Duke TIP Marine Lab, Piver's Island, NC

Options: Grades 8-10, three-week residential
Dates: July 23-August 12
Fee: $2,050
Deadline: May 1

Duke TIP also sponsors a Marine Lab program at Texas A&M University-Galveston for grades 7-10.

Terri Williams, Admissions Officer, Duke University Talent Identification Program, Box 40077, Durham, NC 27706-0077; (919) 684-3847; fax (919) 681-7921

ODYSSEY ACADEMY AT BRANDEIS UNIVERSITY

by Stephen W. Young, Jr.

Because of his aptitude in science, Stephen Young was designated an NSF Young Scholar and received a scholarship from the National Science Foundation to attend this program. To learn more about NSF Young Scholars science and math awards, call the National Science Foundation, (703) 306-1616.

This past summer, I had the privilege of participating in the Odyssey Academy program at Brandeis University, along with students from all over the United States and overseas. For four weeks, we lived in dormitories, took challenging courses, and were motivated by our interest in the topics and by the research opportunities, instead of by deadlines and tests.

Students who enroll in Odyssey Academy choose both a core and an elective course from diverse options ranging from the humanities to medicine. The core course is more intense, and its subjects are explored in greater depth; the elective presents more of a general survey. Both emphasize hands-on learning and active participation. Projects are researched and designed for the science-fair-like "Expo" during the final week, when students present what they have learned.

In my core course, Medical Sleuthing, we studied plagues and epidemics in history and simulated them in laboratory scenarios. Field trips took us to such places as the pathology lab at Boston Children's Hospital, to see how actual doctors and scientists deal with disease.

All the NSF Young Scholars in the Odyssey Academy were placed in an expanded version of Environmental Sleuthing for the elective course. Focusing on the environment of the local Charles River, we divided into groups to study different features of the river habitat and synthesized lab and field research techniques.

If you are interested in expanding both your academic and social horizons through serious yet entertaining study and through contact with diverse people from many places, I encourage you to apply to the Odyssey Academy. ■

*Winner of awards in French, math, and science, 11th grader **Stephen Young** is active in three varsity sports. He plays the trumpet with a jazz ensemble and school band, reviews and collects science fiction films, and enjoys Dungeons and Dragons.*

Odyssey Academy, Brandeis Summer Odyssey

Options: Grades 9-11, four weeks
Dates: July 9-August 5
Fee: $2,750 (free to NSF Young Scholars)
Deadline: May 15 (April 3 for scholarships)

Rabb School, Brandeis University, P.O. Box 9110, Waltham, MA 02254-9110; (617) 736-3424; fax (617) 736-3420

HUMANITIES

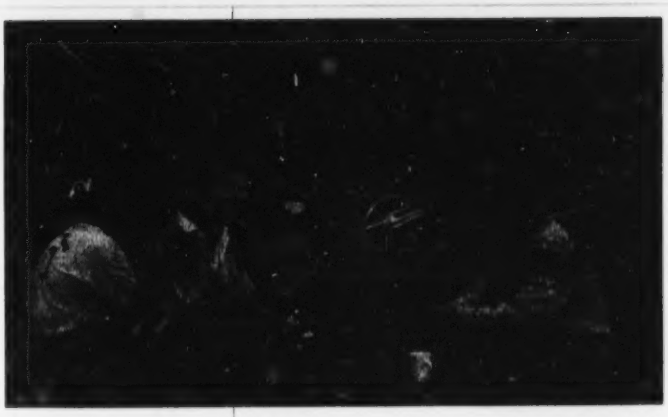
On these four pages, student authors review some summer programs that focus on specific topics in the humanities by moving beyond the standard classroom format.

CONCORDIA LANGUAGE VILLAGES

by Emily R. Sadigh

A weak rendition of *"La Vie de Voyageur"* rang out as the paddlers attempted to keep their spirits up by singing. I yelled ahead, *"Attendez!* Wait!" as my partner and I struggled to keep moving forward against the wind that was pushing us back to the other shore. On our faces were tears, caused both by the bitter wind in our eyes and by our frustration with the lake crossing. Two hours later, drenched and exhausted, we only had the strength to whisper, *"Nous sommes arrivées.* We made it," as we stroked the last few meters to bring our canoe into the calmer water where Cass Lake narrows into the Mississippi River. I underwent many trials at Concordia Language Villages, but reaching that other shore, writing that song in French, and composing that final paper in German were meaningful accomplishments because they did not come effortlessly.

I hadn't expected that having my first German experience at a language immersion village would be easy. But I was not prepared for the feeling of isolation I would experience from not understanding anything that was said to me, especially because I usually am the one to whom others turn for explanations. Several times during my first week of German camp, I sat in the raspberry patch near my cabin, close to crying with frustration; yet I could not be entirely unhappy. I knew I was learning, both by osmosis and by sitting in the raspberry patch with a dictionary and textbook to look up all the strange phrases I would run into each day. By the second week, I realized that I understood the gist of the mealtime announcements and most of the silly word play counselors would use to liven up lunchtime. Even though I still struggled with explaining my needs at the "store" and the "bank," after a few days the struggle was less important. I was thrilled to be able to understand the German songs and enjoy the hour every afternoon when we talked to native Germans about their country's different school system or smaller refrigerators. Before I left camp, it struck me that this kind of comprehension meant more than knowing the adjective endings for the dative case. I gave up memorizing grammar charts and threw myself into enjoying the last few days.



Upon wrapping up my month at the German village, I faced new challenges at the French Voyageur program. After long days of canoeing, campfire conversations with the Voyageur counselors comfortingly reinforced my belief that my interest in languages and other cultures had no reason to end in the classroom as an academic exercise. One of the counselors would recount fascinating stories of his trek across Africa. These tales, particularly one about being invited to spend the rest of his life in a village where he had only been waiting for a bus, helped me get even more excited about the people I hope to meet in my travels. Envisioning myself having the chance to discuss ideas with French-, Spanish-, and German-speaking peoples around the world adds even more to the enjoyment that languages have already given me.

But I really believe that the most unique and special aspect of Concordia is the bond among all the people at a session, whether staff members or campers. After only a few days of living with the girls and counselors of my cabin, I knew I could turn to them with any problems I had. I have been to many other camps, but only at CLV did everyone draw together so closely and so quickly. Although it is the largest village, at Waldsee Bemidji (German), the general atmosphere of caring and trust was almost tangible.

Perhaps of as much importance is the high level of talent and intelligence possessed by students who attend the camps. I never failed to be surprised by the interests and enthusiasms of the people I was living with. Every day I would discover something new about my cabinmates—whether it was Solange's talent at playing the bagpipes, Katarina's role as an archer in the Society for Creative Anachronism, or Tacomb's leading role in "The Mighty Ducks." Even during the occasional times when I was miserably tired, hungry, or confused, I could not help but be content with my luck in being surrounded by such dynamic people. ■

*A resident of Pleasant Hill, California, **Emily Sadigh** is a high school senior in the throes of applying to eleven colleges. She has attended three CLV programs, completing both French III and German I at camp, but says she most enjoyed her two weeks in the Minnesota woods living the life of a French fur trader in the Voyageur program.*

Concordia Language Villages

Options:	Ages 7-18, one-, two-, or four-week residential immersion
Languages:	Chinese, Danish, Finnish, French, German, Japanese, Norwegian, Russian, Spanish, Swedish
Dates:	Vary between June 12-August 26
Fee:	$355 (one week), $760 (two weeks), $1,715 (four weeks, high school credit)
Deadline:	April 1

Concordia Language Villages, 901 South Eighth Street, Moorhead, MN 56562; (218) 299-4544, (800) 247-1044 (within Minnesota) or (800) 222-4750 (out of state); fax (218) 299-3807; Internet: clvoffice@village.cord.edu

The Junior Statesmen Summer School at Georgetown University

by Christopher Swart

It was an unforgettable experience: I was one of 240 students who had the opportunity to live and study in Washington, D.C., and to observe the United States government first-hand.

During the three-week Junior Statesmen Summer School, I took the AP American Government course. We were required to perform well on two tests and write a fifteen-page term paper. Demanding, yet engaging, this course went far beyond the material covered in a typical high school class.

Every night during a Congressional workshop, students debated highly controversial issues ranging from the legalization of marijuana to the denial of a public school education to illegal immigrants. The arguments on both sides were always impressive; the debates often challenged what I believed, and I was often forced to reevaluate my views.

The most exciting part of the Georgetown experience was going to Capitol Hill, the White House, the State Department, and the Pentagon to hear and ask questions of such speakers as Bill Bradley and Warren Christopher. Bob Dole, for instance, angrily fended off questions regarding his obstruction of the Clinton health care plan. The speaker who left the greatest impression on me was Eugene McCarthy, a true activist politician. In his speech, he explained how the much-touted liberal media refused to give him press coverage during his presidential election bid.

Although we had to adhere to a rigorous academic schedule, we still had time to socialize and to explore what Washington, D.C., has to offer. Just as in college, having relatively little supervision forced all of us to plan our time carefully.

Learning about government in the classroom and then seeing how government works in our nation's capital made my Junior Statesmen experience extremely worthwhile. ■

Sixteen-year-old ***Christopher Swart*** *attends 11th grade at St. Anthony's High School in Huntington, New York. His interests include journalism, music, and participating in debates.*

The Junior Statesmen Summer School

Options: Grades 8-11, three- or four-week residential

Dates: June 25-July 22 at U. of Texas-Austin; July 2-28 at Northwestern, Stanford, and Yale Universities; July 9-30 at Georgetown University

Fee: $2,275

Deadline: May 1

The Junior Statesmen Foundation, 650 Bair Island Road, Suite 201, Redwood City, CA 94063; (800) 334-5353; fax (415) 366-5067.

Summer Institute for the Gifted

by Catherine Keyser

Some people might say that the best part of Summer Institute for the Gifted is the chance to fight a duel for the first time in your life or prosecute the witches of Old Salem. Of course, they might also say that it's the chance to live at a college for three weeks, to be on your own, without parental supervision. However, for me, the greatest part about Summer Institute for the Gifted is the people, including some of the best teachers I've ever had, wonderful counselors, and great kids from all different backgrounds and interests.

S.I.G. camps are held throughout the summer at many different college campuses, including Drew University and Bryn Mawr College, the two I have attended. You can take four different courses, each of which meets daily for an hour and fifteen minutes. In my two summers at S.I.G., I took Mock Trials, Fencing, Legendary Figures of the Middle Ages, Social Justice, Painting & Drawing, and Brain, Mind, & Human Behavior. I thought this variety was a really great feature of S.I.G.; you get to study several different subjects you're interested in and still have enough time to spend on each of them.

Everyone has a rec hour as well as a scheduled study hall each day, which allows you more than enough time to get your homework done—and some time to catch your breath. Saturdays are for trips to places such as Great Adventure, the Baltimore Science Museum, and the Renaissance Faire. Sundays are the least busy and a great time to catch up on laundry. The days are full, but not insanely so, and you have more than enough time to meet more wonderful people than you ever dreamed possible. You'll come home from S.I.G. with a full address book and a photo album's worth of wonderful memories. ■

Catherine Keyser *is in the 10th grade at Manasquan High School in New Jersey. She enjoys creative writing, reading, playing the flute, acting, singing, studying history (especially medieval), spending time with her best friends, and playing with her cat, Princess.*

Summer Institute for the Gifted

Options: Grades 4-11, three-week residential

Dates/Sites: June 25-July 15 at George School, Newtown, PA; July 2-July 22 at Drew University, Madison, NJ; July 23-August 12 at Vassar College, Poughkeepsie, NY; July 30-August 19 at Bryn Mawr College, Bryn Mawr, PA

Fee: $2,100 (multiple courses)

Deadline: May 1

Dr. Philip W. Zipse, Summer Institute for the Gifted, College Gifted Programs, 120 Littleton Road, Suite 201, Parsippany, NJ 07054-1803; (201) 334-6911.

Computerized Database of Summer Programs for Gifted and Talented Students

The Council for Exceptional Children maintains a computerized database on over 500 summer programs available within the United States. You may either:

- **Specify a particular region or state, topic or focus, grade level, and/or other criteria.** After the database search, you will receive a one-page description of each program that fits your request. The charge for the basic search is $10; if the number of programs identified exceeds ten, you pay $1 for each additional program description.
- **Or order the entire diskette of programs** formatted in Filemaker Pro (Macintosh only) or ASCII (MS-DOS or Macintosh). The complete database diskette costs $50.

For more information: ***Sandra Berger, The Council for Exceptional Children, 1920 Association Drive, Reston, VA 22091; (703) 264-9471.***

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Penn Summer Academy in Communication Studies

by Susannah Batko-Yovino

I've read about different summer programs in your newsletter—math, science, fine arts, college credit, and study abroad programs—but I have never even seen a communications program listed. So you can imagine my surprise when, in early April of last year, I received a flyer inviting me to apply to the Penn Summer Academy in Communication Studies (PSACS).

I had no idea that such a summer program existed, and I wasn't sure how the application found me—I was later told that marking "communications" as a field of interest on my PSATs identified me as a potential candidate. The application required a high school transcript, a list of activities and accomplishments, a teacher recommendation, and a two-hundred-word essay about a problem facing modern media consumers. Although the application described PSACS as involving a very select group of 35 students from across the country, I sent in my essay and hoped for a reply.

After learning of my acceptance into the program, I hesitated, because I board at school and am not home for much of the year. I wanted to spend as much time at home last summer as I could, and participation in PSACS meant being two hundred miles away for three weeks. However, I made the decision to go. Equipped with a personal alarm, two weeks of self-defense classes, and three weeks' worth of clothes, towels, and junk food, I left for Philadelphia.

The brochure that came with the application gave me the impression that PSACS would be a three-week session of small discussion groups, involving a lot of writing and in-depth analysis of modern media issues. I was surprised to find out that the "PSACS experience" was more like a college lecture class. There was less writing than I'd expected, but there was enough political discussion to keep me happy.

We lived on the University of Pennsylvania campus and attended classes at Penn's Annenberg School of Communication, which sponsors the PSACS program. In the morning from 10:00 to noon, we attended a lecture called "Mass Media and Society." Our guest speakers—mostly Annenberg faculty—discussed topics as varied as the role of advertising in the health care debate and the representation of minorities in the media. We also explored gender roles in the American language, the limits of free speech, and "non-verbal cues of deception" (how to tell whether or not someone is lying). The morning lectures gave me the opportunity to experience other people's perspectives on some of the current changes in media and in society.

For the afternoon and evening sessions, from 2:00 to 4:00 p.m. and from 7:00 to 9:00 p.m., the group of 42 was divided into three smaller groups. We rotated through courses in "Persuasion in Advertising and Politics," which dealt with advertising techniques both in historical and present day television and radio; "Film," which (as you might guess) focused on movie-making, past and present, and its impact on society; and "Technology," which considered topics like the history of telephone companies and TV networks, the formation of large media conglomerates, and potential societal problems posed by the emergence of the information superhighway.

The technology portion provided my first experience with the Internet and e-mail. Considering all the talk about the information superhighway and the technology associated with it, I found it interesting that PSACS would emphasize how the *information* is presented, filtered, and interpreted, rather than how the *technology* is produced. It probably is more important that we, as media consumers, be aware of this facet of the information superhighway, because so many forces are being utilized to encourage us to alter our views and opinions about politics, consumer products, and personal choices. This aspect is rarely explored, and I found the discussion stimulating, educational, and revealing.

Of course, classes were only part of the PSACS experience. Because the Penn campus is located within a reasonable distance of many of Philadelphia's attractions (including shopping areas, historical sites, museums, and restaurants), we spent a lot of time getting to know the city. Curfew was 11:00 p.m. on weekdays and midnight on weekends, so we had a lot of time to explore. We also had the opportunity to visit New York City on a day trip, where we took the NBC studio tour and then were on our own. I had my first subway experience and a wonderful time in the Village. The only disappointment of the day was not catching a glimpse of David Letterman anywhere, but it was Saturday....

Last summer, 42 students from 19 states attended the PSACS program. For me, it was a great opportunity to experience college life without all the pressures that college entails, a great opportunity to get used to life in a big city, and most of all, a great opportunity to meet and get to know different people from all over the country. I'm incredibly glad I overcame my initial misgivings and decided to attend. ■

Sixteen-year-old ***Susannah Batko-Yovino*** *is interested in a range of career possibilities, including medicine, law/politics, writing, and archaeology. Susannah will be appearing on "Teen Jeopardy!" in February. Her article on winning the National Geography Bee in 1990 appeared in the last issue of* ***Imagine.***

Penn Summer Academy in Communication Studies

Options: **Grades 9-11,** three-week residential
Dates: July 10-28
Fee: $2,000 (including NY trip)
Deadline: **May 1**

David Fox, College of General Studies, University of Pennsylvania, 3440 Market Street, Suite 100, Philadelphia, PA 19104-3335; (215) 898-5407, fax (215) 573-2053.

Also offered by the College of General Studies:

- **Penn Summer Science Academy,** commuter and residential, grades 9-11. Small teams work on laboratory projects. Lecture and discussion sessions cover science background, as well as social, ethical, and legal concerns related to science and math.
  Dates: July 10-August 4
  Fee: $1,490-$2,475
  Call Dr. Reibstein, (215) 898-5716.
- **Penn's Precollege Program,** commuter and residential, for students in grade 11 who want to earn college credit for one or two courses with undergraduates from Penn and elsewhere.
  Dates: July 3-August 11
  Fee: $1,385-$4,033
  Call David Fox, (215) 898-5407.

National Journalism Scholars Academy

by Jennifer White

Not often does a young adult have the chance to become reacquainted with childhood's adored land of make-believe professions.

Last summer I attended the National Journalism Scholars Academy (NJSA), sponsored by the National Federation of Press Women and held at The Peddie School in Hightstown, New Jersey. Fifteen students (including me) from eight states and Italy not only studied journalism but put our craft to work as we became working journalists for a month.

After flying nearly 1,200 miles from Kansas City to New Jersey, I was pleasantly surprised to see the beautiful countryside. The campus was packed with plush green grass and a mixture of modernistic and aged buildings.

Four weeks of in-depth classes in English, Backgrounding the News, Feature Writing, Newswriting, and Newspaper Production laid a solid foundation and equipped us for the tasks we were to experience during the month-long odyssey. The world of questioning, thinking, and sweet freedom became apparent as I leaped into a journalist's life.

After four days of classes, it was time to put my new skills to use during our first press conference, at which everyone was to ask at least one question. Time was running out, deodorant thin, and I hadn't asked a question yet. I could feel the eyes of my Newswriting teacher scanning the room, narrowing in on me. There was only one thing to do: I kicked the person next to me to see if he had any miraculous thoughts. Luckily, he did and I was saved—this time.

Following the conference, I had to arrange the few pieces of information I'd gathered and write a news story for my deadline, less than two hours away. This first press conference taught me that I needed to organize my notes and ask follow-up questions after a speaker's presentation.

Homework was plentiful every night, so I learned to prioritize my time. Nights were late because there was a lot to accomplish in one month: reading three novels, old news articles, and two daily newspapers, in addition to doing writing assignments.

Almost every night we rang Dominoes and ordered a couple of cheese pizzas, a necessity while studying late at night. During those stressful times, which I happen to thrive on, I had the chance to become friends with some unique people. Although the focus of the Academy was on writing and reporting skills, there was time for fun and friendship, too.

We took two major trips during the month, one to New York City and the other to Washington, D.C.

I have always dreamed of being in New York City and finally had my chance to see real graffiti and subways and even hear the thick accent of a New Yorker say, "It's just like butter." (I just had to ask someone to say this.) We also saw Lady Liberty, the Empire State Building, and a Broadway play of our choice, which we reviewed for our English class. The rest of the day was ours.

A quick fact about NY: it has got to be the cheapest place to buy postcards. I'm talking ten cents apiece, folks. If you're up for sightseeing, I recommend the Empire State Building.

The third week of the Academy, when we traveled to D.C., was the highlight of my month. For three days we were housed in the lavish Hotel Washington. I was told it was nice, but when I walked in, I felt like someone using indoor plumbing for the first time. I was in heaven.

Here we studied government reporting for three days. We talked with and watched professional journalists while visiting *USA Today*. We also toured the nation's Capitol and the Reinventing Government Alliance and watched the taping of "America's Most Wanted" at Fox Studios.

Each day we had press conferences and tours during the morning and afternoon. The workday ended at 4:00 p.m., and then recess began. It was quite refreshing to veg out. This was when I did my serious bargain shopping. I just love venders. Bet you didn't know you could get a T-shirt for $2. It's all in the attitude!

Only six days remained before we all would go our separate ways, and there was still much to accomplish.

All the skills I had learned were about to be combined as we began to put out a paper in less than a week. I think our initiation into the world of journalism came when we lost half our completed pages a few nights before the deadline. This was the true test to see if we had the guts to be journalists. We worked more quickly and slept less and finished the paper: journalism is all about meeting deadlines.

I never imagined becoming so close to people whom I had known such a short time, but it was inevitable as we were put into situations where we worked as a team.

I discovered I must fail before I succeed, and the world owes me nothing, yet I owe myself everything. I was taught skills to survive in the toughest of work forces.

With the skills I accumulated during NJSA, I can guarantee you I will not be entering the land of make-believe when I become a journalist, but will be walking through the door of a professional building where communicating will indeed be my job. ■

*Senior **Jennifer White** attends Truman High School in Independence, Missouri, where she is news editor of the school paper and section editor of the literary magazine. Her other activities include National Forensics League, Thespians, and Interact (a community service club).*

National Journalism Scholars Academy

Options: **Grade 11 preferred,** four-week residential
Dates: June 25-July 21
Fee: $1,950 + $100 materials
Deadline: **May 1**

Lois Wolfe, Executive Director, National Federation of Press Women Headquarters Office, P.O. Box 99, Blue Springs, MO 64013; (816) 229-1666.

The National Federation of Press Women also sponsors the annual NFPW High School Journalism Contest. Students in grades 9-12 are invited to submit any of their own work that has appeared in print since last year's contest deadline. Awards are given in the categories of editorial, feature, news, sports, personal column, feature photo, cartooning, and graphics. First place winners in each state advance to national competition.

Entry deadline: February 20
NFPW Headquarters Office, P.O. Box 99, Blue Springs, MO 64013; (816) 229-1666

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Enhance your academic challenges with the added excitement of travel and exposure to unfamiliar cultures.

*This program of study-trip awards has been funded annually for over two decades by a grant from the Federal Republic of Germany through its embassy in Washington, D.C.**

CTYI, Dublin

by Sheila Gilheany, Ph.D., Director

The Irish Centre for Talented Youth (CTYI), a national organization for students aged 12-16 with exceptional academic ability, was established in 1992 at Dublin City University in cooperation with CTY at Johns Hopkins.

Actually, the story behind CTYI goes back a few more years, to when a 14-year-old Irish boy applied to the University, having already completed the national final school examination, The Leaving Certificate, after a self-taught programme of study. Although Ireland is a country with a long tradition of great respect and desire for education, there had previously been no national programme for the highly able student.

In response to this situation, Dublin City University—which is the youngest university in Dublin—contacted CTY in Baltimore. After intensive discussion and consultation, CTYI was established to help promote and foster academic excellence throughout the country.

Like CTY, the Centre aims to identify young students with exceptional mathematical and/or verbal reasoning abilities and then to provide services for them, their parents, and teachers. To this end, we conduct an annual Talent Search among 1st and 2nd Year Post-Primary students who are invited to sit the SAT.

One big difference between the CTY Talent Search and the Irish version is the strangeness of the SAT to the educational system here. While the SAT is a key component of college admissions in the U.S., it was virtually unheard of in Ireland, so an enormous amount of time and energy was spent simply in explaining the test to parents and teachers.

About 1,150 students took part in the first two years of our Search, and in response to their outstanding performance, our Summer Academic Programme was established. In its first year, 177 students attended an intensive three-week residential programme offering nine courses; in 1994 those numbers rose to almost 250 students and 15 courses available in subjects as diverse as Archaeology, Irish Literature and Creative Writing, Biotechnology, Mathematical Modelling, Astronomy, Psychology, Media & Communications, and World Geopolitics. The courses are run on lines very similar to those at CTY, moving at a fast pace and at a depth appropriate to the students' abilities. The mixture of intellectual stimulation and warm social grouping has proved to be enormously popular, and over 50% of the '93 students returned in '94.

Perhaps the best part of the CTYI experience has been its international dimension. Over a fifth of the students are from overseas, particularly from the United States, but also from Greece, Sweden, and England. Many of these students are old hands from other CTY programs, who have come to Dublin to immerse themselves in material particularly appropriate to this Irish setting. The works of Joyce, Beckett, Yeats, and Shaw—to name a few of Ireland's literary giants—have been the inspiration of the literature, drama, and writing classes; while the archaeologists have looked back in time to the mysterious Celtic world of the passage graves of Newgrange, which predate the Egyptian pyramids. Field trips are an integral part of many of the courses, and all students have the opportunity to explore Ireland on weekend sightseeing excursions. ■

Irish Centre for Talented Youth

Options: Ages 12-16, three-week residential
Dates: July 9-28, July 30-August 18
Fee: $1,675 (not including airfare)
Deadline: April 18

The Irish Centre for Talented Youth, Dublin City University, Dublin 9, Ireland; 353-1-7045634; fax 353-1-7045693.

AATG Summer Travel-Study Trip to Germany

by Gabe Mangiante

The American Association of Teachers of German's month-long summer study program, centered in Nuremberg, was one of the most fascinating and fruitful activities in which I have participated during high school.

To qualify for the application-interview process, you must score in the 90th percentile or above on the AATG test in German II, III, or IV. The application itself is minimal, more of a background check to prepare the judges for their interview sessions with the students. During the interview, conducted in English, I was asked about different aspects of my studies and inter-

Smart Vacations: The Traveler's Guide to Learning Adventures Abroad
(1993, 318 pp., $14.95)
Published by Council on International Educational Exchange. Order from St. Martin's Press, 175 Fifth Avenue, New York, NY 10010.

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ests, as well as possible contributions and gains for myself and the American and German cultures inherent in the trip. Then we engaged in a brief role-playing situation, in German, on a topic chosen by the judges.

After this exacting selection process, sixty-nine students chosen from across the country were divided into three groups, each of which was assigned to attend a different school within the city of Nuremberg. (The school year runs into July in several German states.) For most of our stay, we received instruction in German history, language, and literature, while engaging in a wide range of social activities.

During the month, we lived with host families, allowing us to interact more fully with the German culture. Host siblings aided us in acclimating and adapting to the German school system and domestic life. Our agenda also included several short *Ausfluge* (excursions) to nearby cities and historical sites, as well as a one-week sojourn and sightseeing tour in Berlin.

A Few Personal Reactions

Never having traveled abroad before, I found that my experience with the German culture both confirmed and dispelled several of my preconceptions. American clothing, music, food, and media pervade much of modern Germany; however, certain German traditions and peculiarities still hold strong.

Attending my host sister Chris' classes at the Neues Gymnasium was certainly an eye-opening experience, as they regard teaching methods and classroom discipline in a completely different light than we do—teachers gave more lecture-style presentations, and students were less attentive than I'd expected.

The city of Nuremberg itself is filled with incredible anachronistic contrasts—one can see a McDonald's or a movie theater in immediate proximity to a huge clock tower dating back to the ninth century. Berlin was another memorable experience, a city in which past divisions seem to be simultaneously denied and emphasized.

I certainly gained a great deal of cultural understanding and improved my language skills. Perhaps more importantly, I made several new friends, both American and German, with whom I maintain contact and whom I will always remember. ■

*To win this travel-study award, **Gabe Mangiante** scored 99% on the National German Exam. Now a senior, Gabe competes on the math team and studies music.*

AATG Travel-Study Trip to Germany

Options: **Grades 10-12**, four weeks. Must be 16 by end of calendar year and have two years of German.
Dates: End of June-end of July
Fee*: Award students pay only for transportation from home to point of departure (usually JFK or Newark) and return.
Deadline: Students with qualifying AATG test scores will be notified.

**AATG also offers these travel-study summer programs for non-award students at a cost, including airfare, of about $2,000.*

German Testing & Awards Program, American Association of Teachers of German, 112 Haddontowne Ct. #104, Cherry Hill, NJ 08034, (609) 795-5553, fax (609) 795-9398.

Duke TIP in China

by Alex Waters

Last summer, I went to China for a month with the Duke University Talent Identification Program, along with nineteen other kids and two counselors (both from China). Although the plane ride across the Pacific took two days, including an overnight stay in Tokyo, the trip was definitely worth it!

We spent the first three weeks studying Chinese at Capital Normal University in Beijing. Our day began at 6:00 a.m. with t ai chi classes (physical exercises designed for meditation, self-discipline, and harmonious well-being). Then we had breakfast, which consisted of rice porridge, steamed buns, fried dough, and seveal loaves of bread. I usually stuck with rice porridge and steamed buns—it's just too hard to spread jelly with chopsticks.

Then from 8:00 a.m. until lunchtime, we split into two classes, beginning and advanced, to study Chinese—a very difficult language to learn. Not only is it dramatically different from English, but the *way* a word is said changes its meaning.

Lunch (and dinner) usually involved a lot of rice with a choice of pork and beef dishes, bean curd (tofu), vegetables, and garlic. (One of our counselors was a Chinese doctor who made us eat a clove of raw garlic every day to prevent stomach illnesses.) After lunch, we all had a one- to two-hour nap, the equivalent of a siesta. Afterwards, we'd load up and visit temples and other historical monuments, or just go shopping.

On Saturdays, we took day trips. Once we went to the Great Wall, and a few of us climbed to the top of the rebuilt section. The view of the mountains was spectacular! Another time we went to a pottery factory and watched people making cloisonné; it was really neat seeing vases and other pottery in all their formative stages. On Sundays, we were on our own, armed with a map of Beijing and a tour book.

After three weeks in Beijing, we hit the road for a seventeen-hour train ride to Shanghai. Very different from Beijing, this city has an odd mixture of 1920s Western architecture and garish neon signs. We spent the night there, attended an acrobatics show, and took a boat ride around the harbor. Then we set out for Wushi, where we visited a lotus farm, and then traveled to Suzhou, renowned for its beautifully landscaped parks. We flew to Hong Kong for the last few days of the trip. Hong Kong contrasts sharply with mainland China. It could pass for a Western city, except that the signs are written in Chinese as well as English, and most of the inhabitants are Chinese.

This trip was a wonderful experience, but you need to be an adaptive traveler, because living conditions and many of the foods are quite different from those in the United States. The coursework is very intensive, so I would highly recommend this course for avid students only. ■

Duke TIP in China

Options: Grades 7-10 Fee: $2,100
Dates: July 12-August 9 Deadline: May 1

Duke TIP also offers international summer study trips to Costa Rica (scientific field studies), England, France, Germany, Italy, and Japan.

Duke University Talent Identification Program, Box 90747, Durham, NC 27708-0747, (919) 684-3437, fax (919) 684-5992.

***Alex Waters** is a thirteen-year-old 8th grader who lives in Carrollton, Georgia. She enjoys competing in debate, foreign language, math, and other academic contests. Alex plays violin, piano, and tennis.*

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ARTS

Options for summer programs in the arts—just a few samples of which are included here—are at least as plentiful as for academic programs of other kinds. You'll want to check the summer catalogues of colleges and universities, as well as those of nationally known specialty camps. Also, ask your instructors for suggestions.

Governor's Schools for the Arts are another opportunity available in some, though not all, states. Although admission is highly competitive, one advantage of such programs is that they are generally heavily subsidized, so are free or have reduced fees.

GOVERNOR'S SCHOOL FOR THE ARTS, SOUTH CAROLINA

by Gabe Mangiante

The South Carolina Governor's School for the Arts offers a five-week intensive study program held on the campus of Furman University in Greenville. Students apply as rising juniors or seniors in one of four areas: music, drama, creative writing, or dance.

The application is relatively simple, with questions based on the arts area chosen by the student. In January, selected applicants must provide an audition or portfolio, depending on the arts area, at Columbia College in Columbia, South Carolina. From these auditions, the final choices are made, and students are generally notified by February. Although the total cost for the program was around $650 when I attended in '93, need-based waivers and local subsidies are usually available.

During the program, we lived in the Furman dormitories, receiving instruction in various classrooms and auditoriums. Little contact was allowed with Greenville itself or the rest of the "outside world." Parents were permitted to visit briefly after three weeks, but otherwise we were forced to make new friends and to rely on our own abilities and resources.

Instruction was relatively intense. As a participant in the instrumental music program, I can say with absolute assurance that I have never practiced as much (or as hard!) as I did throughout those five weeks. However, this practice time was made easier and more enjoyable by the motivation supplied by my private teacher and the other brass students. Expected to make private gains in the area of performance, each music student was also required to give at least one recital.

Overall, the program engendered hard work, productive discussion with teachers and peers, and increased self-confidence and performance ability, while also allowing for time to explore the beautiful Furman campus and to make new friends. I personally gained a great deal in the areas of musical ability, personal relationships, and self-reliance and independence—proving to me that the Governor's School was a valuable experience in more ways than one. ■

*Interested both in composing and performing, **Gabe Mangiante** plays trumpet and piano and is a member of marching, concert, and jazz bands. He has also performed with the South Carolina Regional Band.*

To learn whether your state operates a Governor's School for the Arts, or other state-sponsored summer programs for which you may be eligible, talk to your guidance counselor or call your own State Department of Education.

Fine Arts Summer Programs, Carnegie Mellon University, Pittsburgh, Pennsylvania

Programs in architecture, art, design, drama, and music. Designed to help students decide whether a career in the arts is right for them.

Options: **Grades 11-12,** six-week residential
Dates: June 25-August 5
Fee: $2,794
Deadline: **May 15**

Stacy Scarfutti, Pre-College Programs, Carnegie Mellon University, Pittsburgh, PA 15213-3890; (412) 268-2082; fax (412) 268-7838.

Tanglewood Institute Summer Program, Lenox, Massachusetts

Offered in conjunction with Boston University School for the Arts and Boston Symphony Orchestra. Young Artists programs in orchestra and chamber music, vocal, piano, and composition. Seminars in clarinet, harp, saxophone, Empire Brass, and Listening & Analysis. Visual arts program. College credit offered for most programs.

Options: **Ages 15-18,** eight- and four-week residential
Dates: June 26-August 19 (eight weeks); various dates for four-week programs.
Fee: $1,295-$3,810 (including concert pass)
Deadline: **March 1** (music), **May 1** (visual arts)

Boston University Tanglewood Institute, 855 Commonwealth Avenue, Boston, MA 02215; (617) 353-3386 or (800) 643-4796; (617) 353-7455.

Interlochen Arts Camp, Interlochen, Michigan

Balanced program of study, sports, and relaxation on a 1200-acre wooded campus in northern Michigan. Instruction available in music, visual arts, dance, and theater.

Options: **Grades 9-12,** eight weeks; **grades 3-9,** four weeks; residential
Dates: June 24-August 21 (eight weeks); June 24-July 22 or July 24-August 21 (four weeks)
Fee: $3,550 (eight weeks), $2,130 (four weeks); additional fees for some activities, such as private/semi-private lessons.
Deadline: **Initial screening, February 15**

Interlochen Arts Academy, P.O. Box 199, Interlochen, MI 49643-0199; (616) 276-7472; fax (616) 276-6321.

BEST COPY AVAILABLE

These days, more colleges and universities are welcoming younger students onto campus. Attending a precollege summer program with students your own age is one way to get a taste of college life. But you might also benefit from taking a course with full-time college students during the academic year, as this author did.

LOOKING FOR A CHALLENGE?

TRY A COLLEGE COURSE *by Katy Wischow*

I took a deep breath, walked into the room, and practically passed out. A roomful of unfamiliar adults . . . how did I ever get into this?

In the 1993 Talent Search, CTY awarded me a one-course scholarship to Virginia Commonwealth University. Naturally, I was excited and happy, and I quickly signed up for a class: "Intro. to American History—Reconstruction to Present."

I had no idea what to expect. I was in the 8th grade then, and the only school I had ever known was the kind where you sat quietly, raised your hand, and lived for the bell. The VCU class ended up being great, academically. It was challenging in many ways: The reading was, for the most part, interesting and in depth. And it was really neat to be in a class with a lot of people who would hold meaningful discussions in class about something the professor said, and who didn't consider school completely a chore.

In addition to the reading, we had to do journals—biweekly writings that responded to the reading, class discussions, or whatever else came up. My first one was truly bad. Looking back on it, I can't suppress a cringe. Fortunately, I didn't give up, although at first I felt like it. My later journals were so much better, and although it took some time, I realized I *could* do the work, that I wasn't incompetent.

Relating to the older students was another matter. A lot of people I know could walk into a situation like that and feel right at home. Not I. The first night, I was completely overwhelmed. Not only did I know no one in the class, but the other students were at least five years older than I was, and since this was a night class, many were even older than "typical" college age. Although I never became completely comfortable with everyone, after a while I could hold my own in a conversation and chat with people at break.

Two students, Carolyn and Christie, "adopted" me. Because I wanted to be considered a full, ordinary class member, they were among the few who knew that I was only 13. The first time I was to meet my parents outside the library after class, I thought my protectors were both going to go crazy! Well, I suppose the university isn't in the safest part of town, and it was late. But all semester, I was never mugged, or worse, contrary to Carolyn and Christie's dire expectations. The mother hen bit got on my nerves occasionally as I grew more confident, but I appreciated their protective attitude a lot at first.

The only negative way my shyness in the class affected me was that, for the first month or so, I really didn't enjoy the experience as much as I could have. Overall, once I knew what I was doing, my being younger wasn't too big an issue.

I think that taking the course was a really good move for me, and I think most talented students would benefit by it. I got a taste of college, learned a lot, and became so much more confident. Afterwards, when facing a new and unnerving situation, I could always tell myself that, if I could find my way to and from class (I only walked into the janitor's closet once...) and get up the nerve to walk into class that first night, I could do *anything*.

Time was the only other negative factor, one that other students thinking about a college course should consider. Every Thursday night was booked, which meant that there was always a crunch to get my school homework done before class. The reading and journals also took a while. I felt rushed that semester, but not too badly. It was definitely worth it!

Taking the course was one of the best experiences I've had and a great way to expand my education. As I weigh the benefits against the problems, the scale tips heavily to the good side. ■

*Fourteen-year-old **Katy Wischow** is a freshman at the Governor's School for Government and International Studies in Virginia. She loves acting, writing, and debate; this year she is captain of an "awesome" Odyssey of the Mind team.*

Selected precollege summer programs offering college credit:

Iowa Scholars Academy, Iowa State University

Options: **Grades 10 & 11,** eight-week residential
Dates: June 11-August 5
Fee: $1,000-2,000, based on credit and residence
Deadline: April 1

Keith Davis, Program Coordinator, OPPTAG, W172 Lagomarcino Hall, Iowa State University, Ames, IA 50011-3810; (515) 294-1772; fax (515) 294-6424.

Purdue University Gifted Education Resource Institute

Options: **Grades 9-12,** Nova, three-week residential
Dates: July 2-22
Fee: $1,200-2,300, based on course
Deadline: June 1

Summer Residential Programs, Purdue University, 1446 LAEB, West Lafayette, Indiana 47907-1446; (317) 494-7243; fax (317) 494-4175.

SMU/TAG: Program for Talented and Gifted Students, Southern Methodist University

Options: **Grades 10 & 11,** five-week residential
Dates: July 5-August 4
Fee: $2,275
Deadline: First come, first served

Dr. Kathy Hargrove, Director, SMU/TAG, P.O. Box 750383, Dallas, TX 75275-0383; (214) 768-5437.

For information on other precollege summer courses/programs:

- Consult the regional and local Talent Searches and also the universities with which they are affiliated.
- Take a look at local college catalogues.
- Pick up a copy of ***Summer on Campus: College Experiences for High School Seniors*** (1995, 228 pp., $15). Available in bookstores or by order from Department A40123, College Board Publications, Box 886, New York, NY 10101-0886.

Review by
Lesley Mackay & Charles Beckman

FASCINATING CLASSICS

JANE EYRE: *AN AUTOBIOGRAPHY*

by Charlotte Brontë

We continue our series on selected English literary classics with Charlotte Brontë's ***Jane Eyre***. Since Amanda Claybaugh is now deeply involved with her graduate studies at Harvard, Charles Beckman has agreed to enter this dialogue. (Charles first wrote for us in ***Imagine***'s last issue, "A Creative Writing Career—Can You Get There from Here?")

Charles: In early examples of the English-language novel, a commonly employed literary device was to have the Fates eventually bestow some type of earthly reward on a character who persistently exhibits moral virtue. For example, Samuel Richardson's *Pamela*—published in 1740 and widely recognized as the first fully developed English novel—carries the subtitle, *Or Virtue Rewarded*.

Many early novels served in part as soapboxes for the advocacy of sound ethical qualities, such as constancy, purity, and human compassion. As late as 1847, Charlotte Brontë's masterwork, *Jane Eyre*, reflected this tendency, conveying the idea that moral uprightness would be rewarded with material satisfaction as well as spiritual fulfillment.

Jane Eyre is narrated by its heroine; the novel's first-person point of view helps establish the authenticity of Jane's character. The bulk of the narrative explores her life from mid-childhood to young adulthood. Throughout this account, Jane endures more than her share of hardship. In the periods of her suffering, we feel that we should be sympathetic to her plight; nevertheless, I feel she can be somewhat hard to like. As a child in a loveless home, she is insolent. Later, when she flees her role as governess to begin a wilderness exile, it is hard to pity her for not having secured food or shelter.

Lesley: It *is* interesting, Charles, to consider the conventional aspects of this novel, such as its not-so-subtle promotion of certain moral virtues. For me, though, the vibrant character of its heroine makes up for excesses in the plot or other weaknesses that seem to stem from the strict moral purpose of Charlotte Brontë's story.

Jane Eyre is one of my favorite characters in all of literature. Her prospects are so bleak, her challenges so daunting, that we can almost be overwhelmed by them and overlook the fact that hers is a story of individual triumph.

Like *Great Expectations*, this book charts the rise to adulthood of a poor, obscure, and mistreated orphan. Reading its early chapters, I am not drawn to make critical judgments of Jane's character. I don't find her to be insolent so much as understandably anguished by the terrible way she is treated. Today, the young Jane—like Dickens' Pip—would be considered an abused child.

Charlotte Brontë views Jane's mistreatment with a sober and unflinching eye. Unlike Dickens, this author brings no parody or slapstick to her descriptions of cruelty, to the horrors of Gateshead Hall or the institutionalized inhumanity of Lowood School.

I think Jane has, well, character. She is capable of both endurance and rebellion. She speaks out against the Reeds and maintains her dignity at Lowood Hall. As an adult, she claims equal status with Mr. Rochester when she falls in love, and later rejects an unfeeling proposal of marriage from St. John Rivers.

Charles: I agree with you that Jane is often brave and that she maintains her dignity despite great adversity. But she sometimes makes foolish, if dramatic, choices. The novel allows her to get away with her extravagance, but I think it overindulges its heroine.

Take Jane's adventures after she leaves Mr. Rochester upon the revelation of his existing marriage. The fact that she does not fall victim to tragic circumstance is due not to her own actions, but to her good fortune in meeting the right people and having the right things happen to her. Realistically, she is fortunate to meet not highwaymen or criminals, but a pastor and his two beatific sisters. A little later, she also finds out that a large fortune has been left her by a relative she never knew. There is a Cinderella-like aspect to her sudden good fortune. Call me skeptical—or envious!

Lesley: I see your point; a great deal of dramatic intensity does color certain portions of this book. Yet, I feel that, despite the large-scale trials and tribulations Jane faces, she is a believable example of a heroine who takes control of her life.

Jane is able to make wise decisions and get the best of adversity again and again. Significantly, she does not possess the detachment or the transcendent qualities that characterize Helen Burns or, in a different way, St. John Rivers. Jane neither dies young nor goes to India to become a missionary. Instead of transcending her world, she steadfastly attempts to make her way within it.

Making her way entails not only survival, but also testing her wings and finding a home for her passionate nature. For me, Jane's passionate and, yes, sometimes extravagant side adds a lot to her character and makes this book much more interesting.

Charles: I certainly agree that *Jane Eyre* contains much that is dramatic. In fact, while I was reading the novel, I could easily imagine adapting it into a play. The drama does not entail swashbuckling or horse chases, but rather abounds in small actions taking place in interior settings: a house, an orphanage, a manor, and a modest rural home. One gets little sense of vista, at least in the first half.

Even when outside landscapes are incorporated, only a very limited panorama is presented. For example, the orphanage yard, where each child tends a small garden plot, is surrounded by a high wall that shuts off any view of the outside world. The novel does much less to celebrate the English countryside than do, say, the novels of Thomas Hardy.

Customarily, elements such as landscape contribute to a novel's overall world view. Yet, in *Jane Eyre*, this absence of landscape works. The book is a *tour de force* of introspective mullings over relationships, individual characters, and reflections on why it is good to be good.

Lesley: I see more of a balance in this novel between interiors and exteriors, constriction and expansion, than I found in, for example, Jane Austen's *Emma*. Jane Eyre has quite an adventurous spirit and, at least at one point in the novel, she is committed to expanding her horizons.

As she settles into her duties as governess at Thornfield Hall, Jane acknowledges that she is discontented. "I could not help it: the restlessness was in my nature; it agitated me to pain sometimes." What does Jane want? "[A]ll of incident, life, fire, feeling, that I desired and had not in my actual existence." We cannot imagine Emma Woodhouse admitting to or even having such feelings.

However, it does seem that, for the most part, Jane's restless spirit meets its match not in worldly adventure, but in the dark twists and turns of her attachment to Mr. Rochester. Although unfavorable circumstances and traumatic events force Jane out into the hostile unknown, what she ultimately desires is a place in the interior world of domesticity and love.

Charles: It's hard to know what to make of Mr. Rochester, isn't it? With him, the novel's central notion—that virtue is rewarded—and its corollary—that moral turpitude is punished—are upheld. To a degree. We like him at first for his *joie de vivre*, then find out that he has perhaps had a little too much *joie*. Women keep popping up in his past and present, and he seems to take pleasure in playing cat and mouse with Jane's emotions.

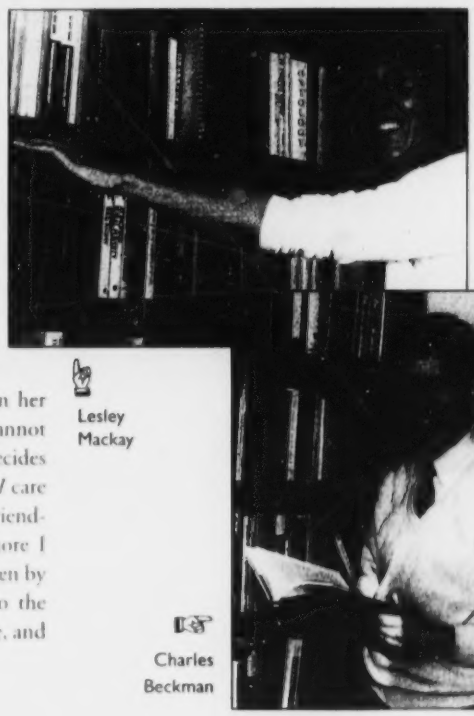
Lesley: He does appear to be toying with her early on in their strange courtship. I find some of the most painful scenes of the novel to be those in which Jane sits on the sidelines of the parties at Thornfield Hall while Blanche Ingram and others make disparaging comments about governesses and treat Jane with offhand disdain.

Part of what makes these scenes hard to read is that we do not understand why Mr. Rochester would expose Jane to such an insulting situation. Why does he require her to join this party? Why does he participate in a flirtation with Blanche Ingram in front of Jane? What are his true feelings for Jane? We know that Jane has already fallen deeply in love. "He made me love him without looking at me." And at this suspenseful point in the novel, many of us may hope that Mr. Rochester will come through for her, too.

But will he? After all, Blanche Ingram—with her dark beauty, wealth, and vivacity—is, in the eyes of the world, a much more suitable match. Later we discover that Mr. Rochester never held Blanche in much esteem. In fact, the novel suggests an association between Blanche and the lunatic Bertha Mason, Mr. Rochester's first wife. In Bertha, Blanche's robust frame, intellectual limits, and shallow sensuality are reflected in grotesque extreme.

As it turns out, Mr. Rochester does want Jane. But I think that the greatest strength of *Jane Eyre* is that its emotional core is provided not by Mr. Rochester's love for Jane, but by Jane's esteem for herself. When Jane first admits her feelings to Mr. Rochester, she adds, "I am not talking to you now through the medium of custom, conventionalities, nor even of mortal flesh; —it is my spirit that addresses your spirit; just as if both had passed through the grave, and we stood at God's feet, equal—as we are!"

Jane's belief in herself is sorely tested when she learns that Mr. Rochester has a living wife. He tempts her to maintain her association with him even though they cannot marry. Although deeply in love, she decides that she must abide by her principles. "*I* care for myself. The more solitary, the more friendless, the more unsustained I am, the more I will respect myself. I will keep the law given by God; sanctioned by man. I will hold to the principles received by me when I was sane, and not mad—as I am now."



Lesley Mackay

Charles Beckman

Charles: And considering the concrete ethical framework of the book, it is no surprise that Jane is amply rewarded for sticking to her principles. When good fortune befalls such a truly good and steadfast character, we, the readers, breathe a sigh of relief—both for the character and, perhaps more importantly, for ourselves. Our expectations have been fulfilled!

Mr. Rochester, perhaps a more complex moral being than Jane, is awarded a more complex fate. In a world in which good behavior is rewarded and bad is punished, he gets both. To give these details away would spoil the suspense for those who haven't read it, but it's enough to say that the outcome pleases everyone, and the punishment makes it unlikely Mr. Rochester will repeat past mistakes. It is a brilliant resolution.

Lesley: I also find the book's ending to be very satisfying and genuinely heartwarming. One thing that occurred to me as I reached the book's conclusion was that *Jane Eyre* is just as concerned with correctness as was Jane Austen's *Emma*. Both Austen and Brontë test their heroines. But all the princess-like Emma must do is prevail over her shallowness and pride; what Jane Eyre goes through is of an entirely different nature. When Jane wrests herself away from Mr. Rochester and finds herself a few days later starving and friendless in an unknown part of the country, we know that this author believes one must go very far indeed in order to do the right thing.

Charles: True. But, Lesley, let's not forget that, like many classics, *Jane Eyre*, though intensely serious, is fun to read. Good fiction should always provide the pleasure of surprises—not out-of-the-blue surprises, but occurrences that have their seeds deep in the novel's characterizations and plot. Brontë makes excellent use of surprises. Think of the "gypsy scene" and the suspenseful moment when you discover what's been hiding in the attic!

Another fun element of great books emerges when a writer takes an active dislike to one or two of her characters and has the talent to portray them as genuinely horrible people. Consider Mr. Brocklehurst, the director of Lowood School, who denies his wards even the puniest of earthly pleasures while his own wife and daughters swathe themselves in ermine and silk. Or think of Blanche Ingram, who, as you point out, is Jane's rather despicable competition in the campaign for Mr. Rochester's affections.

Lesley: So, Charles, it's clear that you enjoyed the novel for its characterizations and for its charming, if improbable, world where good and evil get their just desserts. And what I most like is its determined heroine, who is driven more by her beliefs and her regard for herself than by the world's sometimes harsh opinion of her. ■

Lesley Mackay, *who holds a B.A. from the College of William and Mary and an M.A. in English from Indiana University, is CTY's Staff Writer.*
Charles Beckman *holds a B.A. from Penn State and an M.A. from the Writing Seminars at The Johns Hopkins University. He is an assistant director of Academic Programs at CTY.*

WORDS WORTH REPEATING . . .

In lieu of this issue's "In the Balance" article, we are reprinting an article that first appeared in the Minneapolis ***Star Tribune.*** *The author, Virginia M. MacDonald, is a substitute teacher from Buffalo, Minnesota, whose insights are both humorous and poignant.*

IF CLASSROOMS RAN AS FOOTBALL TEAMS RUN

by Virginia M. MacDonald

WHAT WOULD HAPPEN . . .

IF WE RAN OUR FOOTBALL TEAMS AS WE DO OUR CLASSROOMS:

- Everyone would have the right to equal playing time so that all could develop their athletic skills equally.
- Cooperation would be more important than excellence. Competition would be frowned upon.
- Since star athletes are already talented, they would not need special coaching or conditioning. They could help teach other athletes, since "to teach something is to really learn it."
- We would "coach to the middle."
- We would strive to develop well-rounded athletes. Thus, the star quarterback would take a turn sitting on the bench as a trainer. The student of lower analytical skills would get a turn as quarterback. The out-of-shape student who hates physical activity would get the opportunity to play running back.
- Coaches would be expected to be understanding when jobs, family trips, or homework interfered with practice time by flexibly adapting game plans to accommodate such multiple interests.
- Coaches would be assigned parking lot supervision duty immediately before and after games and during halftime. If athletes had questions about game plans, they could meet with coaches in the parking lot. Coaches would have to plan their plays before or during supervision duty.
- Coaches could not demand too much of students lest they create stress or interfere with many other interests and priorities.
- If the team had a losing season, new philosophies of coaching would be developed. Each new philosophy would discard all previous philosophies. It would require a two-hour training session and supply the coach with a pocket folder crammed with philosophy and objectives. Coaches would plan their new strategies between supervision duties and games.

. . . IF WE RAN OUR CLASSROOMS AS WE DO OUR FOOTBALL TEAMS:

- Teachers would walk into class enthused and fired up with the importance and relevance of what they were teaching.
- Students would be in class because they want to learn. They would respect the teacher and put all their energy into the class. Class would be more important to them than their jobs or football practice.
- Parents would jam the schools asking the teacher how to help their student excel.
- Students wouldn't dare miss class or skip doing homework lest they be dropped from the academic team.
- Students would develop a sense of teamwork and cooperation fueled by their love of learning and challenging of each other. Students would take pride in their classes and demand that their classmates give their best.
- Students would clamor to be "student of the week" or make the honor roll. Other students, teachers, and the community would enthusiastically and supportively be involved in student learning.
- We would have rallies and bands and cheerleaders for National Merit Scholars and honor students. And they would not feel uncomfortable about receiving the attention because this would be every student's dream.
- Every night, the 10 p.m. news would devote a full 10-minute segment to education issues and highlights. The morning radio stations would compete for the education audience.
- Newspapers would devote several pages (or a whole section!), complete with pictures, to academic activities.
- We would demand excellence in the classroom and teach cooperation and patience on the playing field.
- Our society would clamor to build and equip learning facilities because everybody would recognize the value of well-educated citizens to the business community.

This is not to underestimate the importance of educating all students of all needs and abilities, nor to imply that the only form of learning is academic. It is to question why excellence is prized on athletic fields, but the aim of academics is too often the median melting pot. It is to question why new sports facilities are seen as vital to the business climate, yet there isn't enough money for educational facilities; why, when coaches ask for what they need, the community listens, but schools are expected to adapt and make do. It is to question why star athletes are heroes while top students are snobs, elitists, too competitive, intolerant. . . .

Think about it. You wouldn't consider asking an athlete to mask his or her ability on the playing field, yet we ask our academically talented students to do this with regularity.

As a society, what values are reflected in the choices we make? What are the results? If we are serious about wanting a nation that will lead and compete favorably in the world economy, where must our priorities lie? ■

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1. $f(1-x) = \frac{4^{1-x}}{4^{1-x}+2} = \frac{4}{4+2\cdot 4^x} = \frac{2}{2+4^x} \Rightarrow f(x)+f(1-x)=1$

$\Rightarrow f(\frac{1}{1001}) + f(\frac{2}{1001}) + f(\frac{3}{1001}) + \cdots + f(\frac{1001}{1001}) =$

$[f(\frac{1}{1001}) + f(\frac{1000}{1001})] + [f(\frac{2}{1001}) + f(\frac{999}{1001})] +$

$\cdots\cdots + [f(\frac{500}{1001}) + f(\frac{501}{1001})] = 500.$

2. By the Sine Law:

$\frac{OA}{\sin\angle 10} = \frac{OB}{\sin\angle 1} = \frac{OB}{\sin\angle 2} = \frac{OC}{\sin\angle 3} = \frac{OC}{\sin\angle 4} = \frac{OD}{\sin\angle 5} =$

$\frac{OD}{\sin\angle 6} = \frac{OE}{\sin\angle 7} = \frac{OE}{\sin\angle 8} = \frac{OA}{\sin\angle 9}$

$\Rightarrow \sin\angle 10 = \sin\angle 9$

$\Rightarrow \angle 9$ and $\angle 10$ are either congruent or supplementary.

3. The number of the cubes completely free of paint is $(w-2)(l-2)(h-2)$, and the number of the cubes with exactly two faces painted red is $4[(w-2)+(l-2)+(h-2)]$. The number of the cubes with just one face painted red is $2[(w-2)(l-2)+(l-2)(h-2)+(h-2)(w-2)]$.

By the given information,

$(w-2)(l-2)(h-2)+4[(w-2)+(l-2)+(h-2)]-2[(w-2)(l-2)$
$+(l-2)(h-2)+(h-2)(w-2)]=1994$

$\Rightarrow [(w-2)-2][(l-2)-2][(h-2)-2]+8=1994$

$\Rightarrow (w-4)(l-4)(h-4) = 1986 = 2\cdot 3\cdot 331$ $(6\le w\le l\le h)$

$\Rightarrow w=6$, $l=7$, and $h=335$.

4. The largest possible value of n is 98.

Since if n=99, and we take the 50-number subset {1,2,3,....,7, 15,....21,29,....35,43,....49,57,....63,71,....77,85,....91,99}. It is obvious that no two numbers are in this subset with a difference of 7. So $n\le 98$.

To prove that any 50-number subset of {1,2,3,....,98} satisfies the condition, we consider the following seven sets, each has 14 numbers:

$S_t = \{14(t-1)+1, 14(t-1)+2, \cdots, 14(t-1)+13, 14t\}$ where $(t=1,2,\ldots,7)$. If 50 $(=7\cdot 7+1)$ numbers are selected from {1,2,3,....,98}, then there exists at least one S_t $(t=1,2,\ldots,7)$ that contains eight of these 50 numbers. Furthermore, because S_t can be written as the sum of seven 2-number subsets, that is, $S_t=\{14(t-1)+1, 14(t-1)+8\}\cup\{14(t-1)+2, 14(t-1)+9\}\cup\cdots\cup$ $\{14(t-1)+7, 14t\}$, thus at least two of the eight numbers belong to the same 2-number subset, and their difference equals 7.

5. Consider the triangle with a side AB of length 2. The lengths of the other two sides of this triangle can be one of the four pairs: (1) 3,3; (2) 5,5; (3) 4,5; or (4) 3,4 (why?). Let ΔCAB and ΔDAB be the two adjacent triangles having AB as their common side. We need only to discuss the following three cases (why?):

CASE I

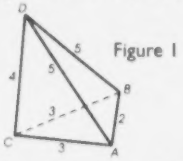

Figure 1

$CA=CB=3$, $DA=DB=5$, then $DC=4$, as show in **Figure 1**.

$CA^2+CD^2 = DA^2 \Rightarrow CD\perp CA$, $CB^2+CD^2 = DB^2 \Rightarrow CD\perp CB$

$\Rightarrow CD\perp$ base ABC $\Rightarrow CD=h_1$ (the height of the tetrahedron)

$\Rightarrow V_1 = \frac{1}{3}\cdot h_1 \cdot$ Area of $\Delta ABC = \frac{4}{3}\cdot\frac{1}{2}\cdot 2\cdot\sqrt{3^2-1} = \frac{8\sqrt{2}}{3}$

CASE II

$CA=CB=3$, $DA=5$, $DB=4$, then $DC=5$, as shown in Figure 2(a), or $CA=CB=3$, $DA=4$, $DB=5$, then $DC=5$, as shown as 2(b).

By symmetry, the two tetrahedrons are equal in volume, V_2.

In **2(a)**:

$DB^2 + AB^2 = 20 < 25 = DA^2$

$\Rightarrow \angle ABD > 90^\circ$

$\Rightarrow 4=DB>h_2$ (the height from D to the base ABC)

$\Rightarrow V_2<V_1$

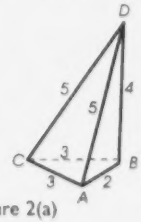

Figure 2(a)

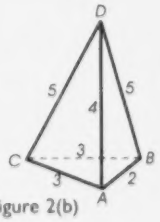

Figure 2(b)

CASE III

$CA=CB=5$, $DA=3$, $DB=4$, then $DC=3$, as shown in Figure 3(a), or $CA=CB=5$, $DA=4$, $DB=3$, then $DC=3$, as shown in 3(b).

By symmetry, the two tetrahedrons are equal in volume, V_3.

In **3(a)**:

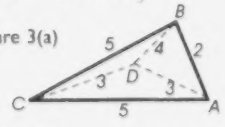

Figure 3(a)

$CA^2+AB^2=29>25=CB^2$

$\Rightarrow \angle BAC<90^\circ$

$\Rightarrow h_3$ (the height from B to the base ACD) $<AB$

$\Rightarrow h_3<2$

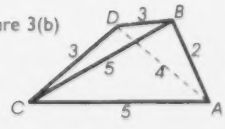

Figure 3(b)

$V_3 = \frac{1}{3}\cdot h_3 \cdot$ Area of ΔACD

$\Rightarrow V_3 < \frac{1}{3}\cdot 2\cdot\frac{1}{2}\cdot 5\sqrt{3^2-\left(\frac{5}{2}\right)^2}$

$\Rightarrow V_3 < \frac{5}{6}\sqrt{11}$

$V_1^2 = \frac{128}{9}$, $V_3^2 < \frac{275}{36}$

$\Rightarrow V_3 < V_1$

We conclude that the largest possible volume of the given tetrahedron is $\frac{8\sqrt{2}}{3}$.

Mr. Feng teaches mathematics at the Oklahoma School of Science and Mathematics (OSSM) and has coached many students who have competed successfully in mathematics contests in China and the U.S. In this column, Mr. Feng offers *Imagine* readers questions designed to improve their problem-solving skills.

STUDENTS REVIEW

AMHERST COLLEGE

College Review Series

This on-going series is intended to aid prospective college students in their search by offering insiders' views of selected colleges and universities, as expressed by current undergraduates or recent graduates who have exceptionally high academic ability. These students share a general bias in judging undergraduate education: they all have high expectations for a college or university's academic standards, its institutional and instructional flexibility, and its respect for nurturance of emerging talent. In this issue, we focus on Amherst College.

Note that the number of student reviewers is small. Consider their personal perspectives as only one component while you gather factual information and impressions from such other sources as college catalogues, site visits, talks with officials and students on campus, and the advice of your guidance counselor and teachers.

Amherst College

Our reviewers include twelve students, who major(ed) in biology (1), chemistry (1), computer science (1), English (2), environmental studies (1), French (1), geology (1), jurisprudence & social thought (1), math (1), music (1), political science (1), physics (2), and Russian (1). (The number of majors exceeds twelve because three students have double majors.) Students' comments appear within quotation marks.

Quality of Academic Instruction for Undergraduates

Reviewers gave high marks to the quality of the faculty and the individual attention students receive. Amherst is a member of a consortium of five schools that are within about ten miles of one another (the others being Smith, Mount Holyoke, and Hampshire Colleges, and the University of Massachusetts at Amherst). Students may cross-register for classes at other schools; a free shuttle bus service operates between the campuses.

*"One of the premier small liberal arts colleges, Amherst serves **only** undergraduates. Only professors teach classes, and it is hard to find a class over one hundred (with the average size being 25-30). The professors are almost all extremely competent, many are leaders in their fields. In general, everybody—especially thesis writers—has one or two close faculty 'friends.' As for resources, Amherst compares with schools much larger in size, in part because the Five College Consortium adds considerably to one's options, providing far more than other small colleges can."*

*"There are always exceptions, but I think the quality of the faculty at Amherst is terrific, in both scholarship and teaching. At colleges like Amherst, the faculty are there because they **want** to **teach** rather than focus primarily on research, faculty conduct classes, help sessions, and labs. Most faculty members are extremely accessible, and the development of person-to-person (rather than student-lecturer) relationships is encouraged. By junior or senior year, many students are doing an independent study, often leading to a senior honors thesis."*

"Probably what I enjoy most is getting to know my professors. They are fascinating people and very accessible. Just yesterday I had an hour-and-a-half conversation with my Quantum Physics & Relativity prof about everything from the definition of time to Serbia to materialist philosophy. I've hiked and dined with many of my profs here, and it has greatly enriched my in-class learning."

"One of the greatest attractions to me was the absence of a required curriculum, that gives students a tremendous amount of academic freedom and is indicative of Amherst's philosophy that stresses personal choice and responsibility. The only requirement is that freshmen take one of about 14 interdisciplinary courses (called Introduction to Liberal Studies, including such offerings as 'The Imagined Landscape,' 'Mind,' and 'Icons & Iconoclasm'). The Five College Consortium is also a tremendous resource for research and more exotic or specialized classes."

Social Life

"Social life at Amherst is going through some (sometimes painful) changes. In some ways, the college is still recovering from the outlawing of frats in the mid-'80s. The college has tried to replace traditional weekend frat parties with school-sponsored events, some of which are very popular. Alcohol and, to a lesser extent, drugs are widespread, but students who use neither are not pressured to do so. Movies are another popular activity. There is also a great network of student activities; the Outing Club, for example, involves a lot of students. An advantage of the small size of the school is the ease of getting involved—I became an editor soon after joining the newspaper. With an effort, everyone can find a comfortable niche."

"The quality of Amherst social life is in the eye of the beholder. It's not a huge party scene, although you can find some of that on the weekend. At the other end of the spectrum, there are many things to do, for those interested in movies, lectures, concerts, etc. The town of Amherst is nice, although exhaustible in four years. Fortunately, the delightful town of Northhampton—where one can find an art movie theater, cafés, and stores that sell just about anything—is only 15 minutes away and takes up the slack."

"The other four schools in the area can really be excellent resources—one that, I think, is under-utilized by most Amherst students. UMass in particular draws a number of prime events to the valley. Amherst itself brings many wonderful entertainers to the area and has thriving Music and Fine Arts departments. Every year, the Music Department hosts a series of concerts by well-known performers, such as Emmanuel Ax and the Waverly Consort. There are also concerts given by Amherst's orchestra and its many a cappella singing, chamber music, and jazz groups."

"There has been a large increase in 'theme houses' (housed in the old frats) dedicated to French, fine arts, Black culture, etc. People apply to live in the houses, and those who live there are expected to practice the theme (e.g., speak French whenever they're there) and support related events for the rest of the student body. In some ways theme houses tend to promote divisiveness, but at their best they can educate other students."

"The student body is largely from Massachusetts/New York/Mid-Atlantic, but there are enough students from other places that it's

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not homogeneous. Sports are popular, especially basketball, rugby, and lacrosse. Politically, the school is something of an ivory tower—expression of political sentiment is not exactly prevalent here."

What Do You Like Best about Amherst?

Respondents emphasized the close student-faculty relationships that the school promotes and the comfortable and enriching relationships they have formed with their fellow students.

"My professors and the way they've stretched my mind. This has been the most challenging experience of my life."

"The opportunity to really get to know my professors and to work individually with them on research projects. I wouldn't be a scientist now had I not done a research fellowship with one of the faculty. I have found the Amherst faculty to be absolutely supportive and encouraging of students' ideas and goals, and I have mentors there who will remain so for many years to come."

"I find myself surrounded every day by an enormous number of very bright people with a wide variety of fascinating activities and interests. The school is full of extremely intelligent but very laid-back people. It is a friendly place and an easy place to get used to. Hostility between students is rare—there aren't any large rifts racially, classwise, or otherwise—as is competition for grades or for anything else. The location is also a wonder—the autumn leaves are breathtaking!"

What Do You Like Least about Amherst?

Several respondents discussed drawbacks of the lack of a core curriculum and the small size of the faculty; others voiced concerns about grade inflation and the less-than-rigorous attitude it can foster.

"The absence of a core curriculum has been a topic of heated debate for years. While I enjoyed the freedom to take whatever classes I wanted, when I wanted, I think there is a definite case to be made for having a set of core classes that all students take. I feel it would help both in building a somewhat more cohesive student body—by allowing for more of a 'common experience'—and in providing a common background upon which faculty could build in upper-level courses. The humanities departments have very few sequential offerings (upper-level courses that students can take only if they have completed lower-level courses in the area). This leads to many humanities classes being taught from an introductory level, because faculty cannot assume any background knowledge."

"Certain departments' course offerings seem embarrassingly insufficient. I went to Amherst planning to double major in music, but found to my dismay that that department offers barely any courses in music history beyond an intro level. This is a common problem in the smaller departments with only four or five permanent faculty members. The Five College Consortium alleviates this problem to some extent, but taking courses at the other colleges can cause logistical problems, and the quality of instruction is not always as good."

AMHERST COLLEGE

Amherst, MA 01002
(413) 542-2000

- 4-year private coed college
- Campus in a small college town
- Full-time undergraduate enrollment
  1994-95: 891 men; 717 women
- Special features
  The Five College Consortium

"I disliked the fact that there were no upper-level classes in the humanities. In general, by my senior year the school felt too small."

"Grades at Amherst are indeed inflated. Many professors feel the need to coddle their students and never give any grade lower than a B. I understand that grade inflation is a trend at many schools, but I feel that it only inspires an atmosphere of mediocrity."

"I think that professors' expectations of students should be higher—many courses are not as demanding as they should be. I often feel that I would like to be more challenged."

"I understand now what people meant when they referred to Amherst as a 'party school.' A surprising number of people here will pass up intellectual activities or class work for social activities. One of my first-year roommates once told us that he planned to double major in sports and partying. It is possible to ignore this aspect of life at Amherst, but it takes some effort, due to the small size of the place."

"There are a few students who seem to take everything for granted—who coasted in on family money and plan to coast on the Amherst name for the rest of their lives."

Who Would Be Most Compatible with the Academic and Social Atmosphere at Amherst?

"Amherst is a 'work hard, play hard' kind of place. It is also a place that allows students a lot of independence; responsible students who do not need outside pressure will do best."

"You have to have discipline, from budgeting your time well to picking appropriate classes. Amherst is not difficult to slide through without too much effort, so in order to receive the full harvest Amherst has to offer, you have to be self-motivated and willing to put in some work."

If You Had It to Do Over Again, Would You Go to Amherst?

All but one respondent said yes; one has chosen to transfer to a larger university.

"Absolutely. Amherst is a wonderful school academically, and I had opportunities there that I might not have had at a larger school. I wouldn't trade the relationships I have with faculty members for anything. By my senior year I started to feel suffocated by the college and the people, but I take that as a sign that I needed the smallness when I started and Amherst helped me grow to the point where I could move on to greater things. I don't think Amherst is the ideal school for everyone; however, for someone who wants an excellent education with the flexibility that only a small liberal arts college can offer, I would recommend Amherst without reservation."

"Absolutely. I'm very happy, and most of my friends are satisfied. However, a couple of my friends have transferred out. One transferred to a big research university—Amherst was too small for him. In a school this size, there are not as many offerings per department as at a university, and no graduate-level courses. Prospective students really need to focus on these factors."

As you try to find the college or university best suited to you, the views on Amherst College presented above may be helpful. Keep in mind that these students might have had similar positive or negative experiences had they attended a different university. At any college, it is important for the individual student to seek out challenging academic experiences and the best professors and to create a social life that best fits his or her personal style. ■

ImaGiNe...

Submit your creative work—brain teasers, short stories/essays/book reviews. We look forward to hearing from you.
Please write to *imagine* • SET at CTY • The Johns Hopkins University • Baltimore, MD 21218

A Space I Inhabit

by Daniel Slosberg

Like the Mecca of old, Internet has become the land where kings and commoners mingle, sharing ideas freely. Contacts are made; friendships begin. The "Net" sets up a safe place for anyone and everyone to come together.

The Earth has been shrinking since the first cave people reached out to one another. Now it's the Net that is helping to pull us all together. People operating from libraries, schools, businesses, and even their basements have created this new planet of the Net, where strands of human contact are woven together, connecting us, defining our place in this space.

The Net is a world where your name, your "handle," is your face. My handle is Salinay, from the Tolkien Elven, meaning "the lone wanderer." As Salinay, I travel the ever increasing paths in this growing forest, leaving trail marks behind me. Even when I am absent, I am present in my messages. Marks in the dust are noted; responses are left. Eventually time will erode these jottings, but they will have served their purpose. New jottings by other wanderers will replace mine.

Occasionally I happen upon a city in the Net: a brief respite in the local gathering places, a journey or two with friends old and new. Then as I shut down my terminal, I smile, happy to have met friends from California, Russia, or even my home school. Some I have never seen away from the Net, yet that diminishes them not a whit. This is a world where who you are is more important than what you are.

The Net forces you to be open minded, since anyone who can read and write can share ideas here. On the Net there is no black or white, gay or straight, male or female, adult or child. You could be seven years old, or seventy. You could be from any part of the globe. Here you are judged by the qualities of your ideas rather than by your past or physical being.

Travelers and traders have been linking human communities since the dawn of civilization. The Net facilitates this interchange of human experiences and helps shape a global view of humanity.

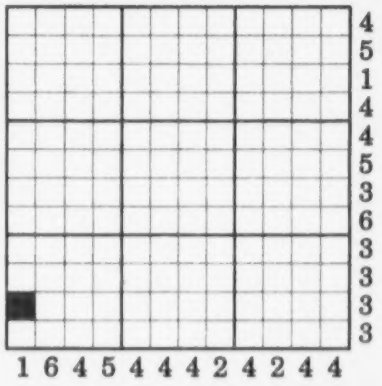
Through the new connections people are making on the Net, seeds are sown. The seedlings require care and upkeep. The forest grows; the continent expands. The next step in human development has been taken.

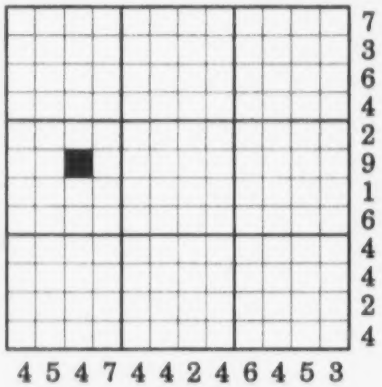
Like the Mecca of old, Internet has become the land where kings and commoners mingle, sharing ideas freely. This is a space I inhabit. ■

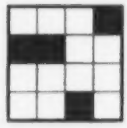
*A high school senior attending Hackett Catholic Central High School and the Kalamazoo Area Math and Science Center in Michigan, **Daniel Slosberg** has been accepted by the Universities of Chicago and Michigan-Ann Arbor. He plans to study environmental engineering with special emphasis on biological systems and computer engineering.*

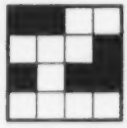
More Puzzles

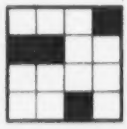
by Tim Boester

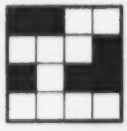










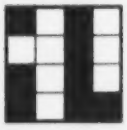


Directions:

Top: Use the two 4x4 stamps at left to fill in the squares of the 12x12 grid. Each stamp may be rotated so that any of its four sides faces upward. When the grid is correctly filled in, the total number of black squares in a row or column will equal the number found beside or below that row or column.

The squares already blacked in are hints to get you started; they must be black in the completed puzzle.

Bottom: The rules are the same for this puzzle, except that you may use all three stamps at left to fill in the squares of the grid.



Solution to Puzzle in November/December issue of *Imagine*, by Tenie Remmel:

R U R L D R U R D F, L R D U R U L D L D R U R

where R=right, L=left, U=up, D=down, F=fly

*Fascinated by mazes and puzzles, **Tim Boester** is also intrigued by roller coaster design. Tim is a freshman at the University of Chicago, where he plans to study physics and math.*

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VOLUME 2 • NUMBER 4

Opportunities and Resources for Academically Talented Youth

Spotlight On

SCIENCE & TECHNOLOGY

March/April 1995

Mailbag **2**

Science Competitions: Reaching for the Stars **3**

Research Internships: A Perspective on the Professional World of Science and Technology **8**

Research Science Institute: Combining Academic Stimulation with Intense Socialization **10**

Putting your Summer Job to Work **11**

Venturing into Wonderland: Of MOOs and MUDs and Mailing Lists **12**

The Network of Networks: Something for Everyone **13**

Computer Science—Combining Verbal and Mathematical Skills **14**

High School Computing: The Inside Story **15**

The Coach's Corner **17**

In the Balance: Standardized Achievement Testing—Why We Need It, and What It Can and Cannot Do **18**

Fascinating Classics: The Great Gatsby **20**

Students Review Columbia **22**

Creative Minds Imagine **24**

Returning to their hometown last May are the '94 Science Olympiad national championship team with their trophy, held by Danny Yavuzkurt (page 5).

Photo by Cathy Seith

Scientific discovery—it's hard to imagine any accomplishment more important to human history, or to the legends that we employ in order to communicate who we are. Archimedes in the bathtub shouting "Eureka!" as he observed his own shape displacing the surrounding water . . . Galileo probing the workings of the solar system . . . Isaac Newton pondering the fall of an apple from a tree.

Each year, increasing thousands of precollege students participate in the unfolding of scientific progress—in their home laboratories, by computer, through research mentorships and summer programs, and in science fairs and competitions. Each of these activities has its own particular appeal, but all of them foster a deepened sense of the fascination of science and math, and of each person's potential as discoverer.

These days, some people may still develop intuitive insights while sitting in a bathtub or contemplating a piece of fruit. However, cutting-edge research is increasingly connected with the sophisticated technology of powerful computers, molecular biology, robotics, and fractal geometry. For those of you who went straight from a rattle to a computer mouse, this high-tech realm may be as much a part of everyday life as pizza deliveries and call-waiting.

Whether you're a novice or already accustomed to bending complicated technology to your own whim, a variety of pathways can offer you access to the exciting world of science. In this issue, we discuss selected competitions in science and technology, examine several options for research internships, and explore a few of the ways in which computers are rapidly expanding our intellectual and social horizons. ■

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MAILBAG

Q: *I am in the 10th grade in a small public high school. Although the school has been responsive to my needs and has allowed me to take classes with older students, I am concerned about the relative lack of opportunities it offers. I have met students at CTY whose schools have many more Advanced Placement courses, more challenging extracurricular opportunities such as math teams, and teachers who prepare students for the Westinghouse Science Talent Search. My school doesn't have any of these things. I am running out of courses, and I worry about the likelihood of my getting into a top college when my application is compared with those of students who have had such opportunities.*

A: Admissions officers are aware that some high schools offer more opportunities for academically talented students than others do. Colleges and universities also want to attract a diverse student body, so they try not to discriminate against exceptional students from schools that do not offer such options. Nonetheless, they will be attracted to students who have sought options both in and out of school to maximize their precollege learning experiences.

You have already shown a willingness to do this by taking advanced courses in your high school and by attending an academic summer program. You can also supplement school course offerings in other ways:

Enroll in college courses, either by attending a college in your community or by taking correspondence courses by mail or computer. Look into the possibilities of studying abroad for a summer or a semester. If there are extracurricular activities that you wish your school offered, work on starting them yourself. (For example, see Ashley Reiter's article on starting a math club, in the September/October 1994 issue of *Imagine.*) Seek out your own mentorships and internships for Westinghouse projects. And, of course, use your leisure time in enjoyable ways that enhance your learning—read widely, write articles for publication, do math problems, travel, volunteer in your community. If your options for senior year look particularly slim, consider applying to college a year early.

Admissions officers value students who are willing to take responsibility for their own learning and show initiative in seeking out or creating opportunities for themselves. But don't work only to impress colleges. It's vital that you stay challenged academically during your precollege years so that learning remains exciting to you. And by taking advantage of learning options beyond the walls of your high school, you will develop the attitude and skills to continue learning throughout your lifetime.

The purpose of *Imagine* is to help students locate opportunities for academic challenge, so read each issue carefully for more ideas. We urge you, and all our readers, to write to us if you have specific questions or concerns we haven't addressed. ■

What Will the SAT Renorming Mean for Me?

In response to many queries from students and parents, we will include an article dealing with questions and concerns about the renorming of the SATs in the May/June issue of *Imagine.*

Correction: Due to a computer glitch (honestly), the biographical blurb for Brian Shillinglaw, who wrote in our January/February issue about the Duke TIP Marine Lab (p. 9), was incomplete. It should have read: Brian Shillinglaw enjoys writing, singing, backpacking, playing soccer, and—above all—reading. His other interests include Taoism and Chinese culture.

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Are You a New Subscriber?

If you're enjoying your first issue of *Imagine,* you may also be interested in some of the topics we covered in previous issues. During this school year, our cover stories have focused on two other academic areas: Mathematical Problem Solving (September/October) and the Humanities (November/December). Also, if you're still looking for a challenging summer program, you may want to read the variety of articles on Academic Summer Programs (January/February).

To obtain back issues at $3.00 each, you may call the JHU Press at (410) 516-6989 or (800) 548-1784.

Imagine...
Opportunities and Resources for Academically Talented Youth®

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SET Director • Linda E. Brody, Ed.D.
Research Associate • Carol C. Blackburn, Ph.D.
Staff Writer/Editor • Susan B. Hellerman
Staff Writer • Lesley Mackay
Contributing Writer • Charles Beckman
Administrative Assistant • Patricia A. Wade
Designer, JHU Press • Lesli M. Lai

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Address editorial correspondence to:
Susan B. Hellerman
SET at CTY
The Johns Hopkins University
Baltimore, Maryland 21218
Phone: (410) 516-0309 • FAX: (410) 516-0108
E-mail: setcty@jhunix.hcf.jhu.edu

SCIENCE COMPETITIONS
Reaching for the Stars

Helping you cultivate high expectations—for yourself, your learning, and your accomplishments—is one of the primary values of science competitions. Sometimes comprehending all you can achieve requires only a small, but vital, shift in your own perspective.

In academic competitions, the value is in the process. Winning is not everything, or even close. The satisfaction of moving from start to finish on a challenging project can even outweigh the thrill of being chosen for an award, however marvelous such an outcome must be. And colleges and universities reviewing students' applications recognize participation in science contests as a definite plus. At the very least, such involvement demonstrates inventiveness and persistence, qualities that certainly predict later academic success.

Whether the competition is the type that involves conducting original research for science fairs, transforming abstract concepts into concrete solutions in tests or team events, or crafting innovative programs for computer challenges, science contests are all about pushing limits—certainly, pushing the limits of scientific knowledge, but especially, pushing your personal limits.

For our purposes, we have divided the following selected science competitions into four categories: science fairs and projects, multi-event team contests, computer science, and science tests. ■

SCIENCE FAIRS & OTHER PROJECT COMPETITIONS
Exploring the Unknown through Original Research

By promoting the process of independent inquiry—and, of course, hard work—science competitions that require independent research encourage you to assume the role of investigator in uncharted territory. After that, extraordinary outcomes are possible.

Take the case of Ashley Reiter, who won first prize in the prestigious Westinghouse Science Talent Search in 1991 for her mathematical inquiry into the dimensions of fractals. (Her $40,000 Westinghouse scholarship award was put to good use when she went off to pursue math at Rice University, where she is now a senior.)

"Winning the Westinghouse gave me a lot of additional self-confidence," says Ashley, describing her experience in the Science Talent Search as important to both her academic and personal development. Embarking on her undergraduate career, Ashley found herself in fast-paced classes with very talented students; her top-flight participation in the Science Talent Search reminded her of all she could achieve when she stuck with a challenging course.

Value of Mentorship

Of course, young discoverers usually don't travel solo. Ashley received critical support and instruction on fractals at the Research Science Institute (see p. 10) before fully launching her project. She credits RSI with encouraging her to enter the Westinghouse competition with high expectations.

Most science contest success stories are grounded in similar relationships involving teachers or other experts who are willing to act as consultants for students who have set their sights on completing a project.

Where to Start

When it comes to selecting a project topic, it makes sense to temper your own curiosity with what is realistically possible: choose a project that both interests you and can be explored adequately, given the available time and accessible equipment.

If you have long been fascinated by aspects of biochemistry or the environment—or by fractals—these passions can lead you in the direction of projects that will hold your interest and sustain your dedication. On the other hand, serendipity can also be a valuable muse. Jennifer Kalish, the 1994 Westinghouse finalist who placed eighth in national competition, happened on her project idea while staring absently at a juice box in her school's cafeteria and wondering about the effects on human consumers of the leeching of the box's aluminum lining. (Jennifer was profiled in last year's May/June issue of *Imagine*.)

Long-Term Benefits

Whether you uncover your project idea in the course of rigorous academic work or it drops like an apple onto your head, the decision to enter a science competition can be one of the best of your precollege experience. The discipline, imagination, and independent thinking entailed in challenging scientific work may not win you a top competition award, but they will serve you well throughout your learning career. ■

International Science & Engineering Fair
(invitation only; individuals and teams) **Grades 9-12**

Held each May in a different city, the ISEF involves more than 900 students chosen from among finalists in ISEF-affiliated regional fairs across the U.S. and abroad. Invited participants receive an all-expenses-paid trip to the week-long ISEF convention, where they present their projects to the scientific community and take tours of academic, cultural, and historical interest.

ISEF participants compete for over 600 awards valued at nearly $400,000; included are cash prizes, trips, college scholarships, summer research positions, and equipment. Most sought after are the all-expenses-paid trips to the European Community Contest for Young Scientists and the Nobel Prize Ceremonies in Stockholm, Sweden.

This year's ISEF will be held May 7-13 in Hamilton, Ontario, Canada.

Call for information on ISEF affiliates in your area. Science Service, Inc., 1719 N Street, NW Washington, DC 20036; (202) 785-2255.

SCIENCE FAIRS/PROJECTS, *continued*

Westinghouse Science Talent Search

(individuals) **Grade 12 only**

Students prepare independent research projects in the physical sciences, behavioral/social sciences, engineering, mathematics, or biological sciences (excluding live vertebrate experimentation). They then submit written reports on these projects, along with their school transcripts, test scores, and teacher recommendations.

Three hundred students are named honors semifinalists, and forty finalists are invited to the all-expenses-paid five-day Science Talent Institute held in March in Washington, D.C. During this time, participants stage a public exhibition, meet with scientists and public officials, take sightseeing trips, and attend an awards banquet/ceremony.

All 40 finalists receive college scholarships: the top three are worth $40,000, $30,000, and $20,000, respectively; the next seven, $15,000 or $10,000; and the remaining thirty, $1,000 each.

The 54th annual Westinghouse Science Talent Institute took place March 8-13, 1995.

Registration deadline: December 1, 1995

Science Service, Inc., 1719 N Street, NW, Washington, DC 20036; (202) 785-2255.

NASA/NSTA Space Science Student Involvement Program

(individuals and teams; U.S. residents) **Grades 3-12**

These five competitions are designed to foster scientific literacy, especially in the fields of aerospace science and technology:

- ***Aerospace Internships*** (individuals; grades 9-12) Students propose experiments that could theoretically be performed at a NASA facility, in one of eight categories: Supercomputer, Microgravity, Wind Tunnel, Space Station, Spacelab, Space Astronomy, Launch Operations, and Space Telerobotics.
- ***Mars Scientific Experiment Proposal*** (individuals, grades 9-12)
- ***Mission to Planet Earth*** (teams, grades 6-8)
- ***Interplanetary Art*** (individuals, grades 3-12)
- ***Future Aircraft/Spacecraft Design*** (teams, grades 3-5)

First-place national winners in each of the Aerospace Internship categories receive a one-week educational internship at a NASA Research Center. Other national prizes include all-expenses-paid trips to Space Camp, the National Space Science Symposium, or a NASA Center.

Registration deadline: January 10, 1996

National Science Teachers Association, Attn: SSIP Competition, 1840 Wilson Boulevard, Arlington, VA 22201; (703) 312-9361.

National Engineering Design Challenge

(teams) **Grades 9-12**

NEDC challenges students to spend a semester solving a real-world problem by applying mathematics, science, and engineering technology to a defined situation. Junior Varsity teams' solutions are reviewed and awarded recognition. Varsity teams compete at regional, state, and national levels by demonstrating and defending their solution process and working model prototype before a panel of experts. JETS mails information to schools in the fall.

Registration deadline: Mid-October 1995

Junior Engineering Technical Society, 1420 King Street, Alexandria, VA 22314-2794; (703) 548-5387, fax (703) 548-0769; e-mail: jets@nas.edu

Toshiba/NSTA ExploraVision Awards

(school teams) **Grades K-12**

Teams of three or four students work with a teacher-advisor to create a project predicting technological advances twenty years in the future. Projects must include a descriptive paper and ten storyboard scenes representing the students' ideas. Each team chosen as a regional finalist then submits a project video.

Each member of the four first-place teams receives a $10,000 U.S. Savings Bond; each member of eight second-place teams receives $5,000 in savings bonds. Winning teams also receive some money toward a trip to Washington, D.C., for the awards ceremony.

Registration deadline: February 1, 1996

ExploraVision Awards, Toshiba/National Science Teachers Association, 1840 Wilson Blvd., Arlington, VA 22201; (800) EXPLOR-9.

Seiko Youth Challenge*

(school teams) **Grades 9-12**

Teams of two to four high school students with a teacher-advisor submit a written proposal that identifies, investigates, analyzes, and proposes a solution to a specific environmental problem in their community. Twenty-five teams chosen as regional finalists submit a videotaped version of their project.

The winning team divides a $25,000 college scholarship and receives $5,000 for their school. Four runner-up teams divide $5,000 scholarships and receive $1,000 for their respective schools.

*Sponsorship of this competition may transfer to another company for next year; call The DRB Group in September for clarification.

Registration deadline: Late February 1996

Seiko Youth Challenge, c/o The DRB Group, 20 Summer St., Stamford, CT 06901-2304; (800) 323-1550.

Duracell/NSTA Scholarship Competition

(individuals; U.S. citizens) **Grades 9-12**

Each participant creates and builds a working device powered by one or more Duracell batteries, then submits a two-page typewritten description, wiring diagram, and photograph of the device, along with an official entry form. One hundred finalists are invited to send their devices to Duracell headquarters for final judging.

Monetary awards include the first-place prize of a $20,000 U.S. savings bond.

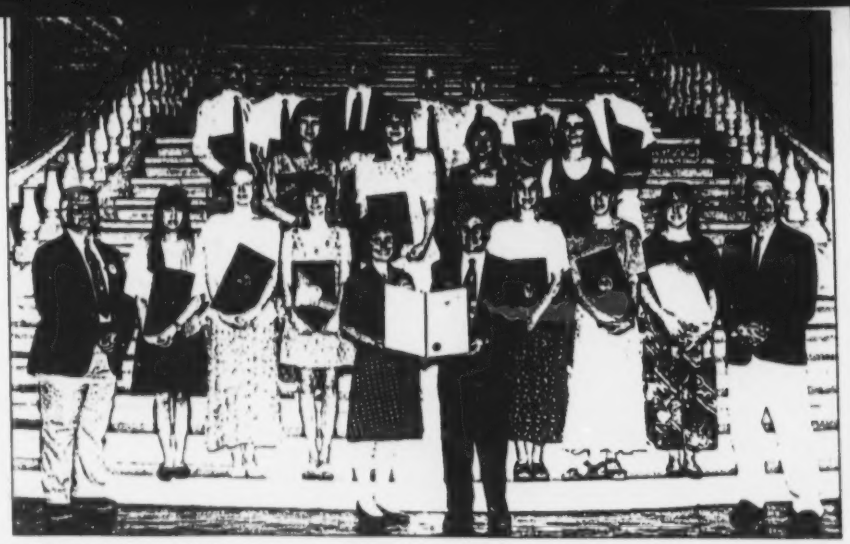
Entry deadline: Mid-January 1996

National Science Teachers Association, 1840 Wilson Boulevard, Arlington, VA 22201; (703) 312-9260.

Multi-Event Team Science Competitions

Reaching Your Limits and Surpassing Them

Effectively dispelling the stereotype of the "nerdy scientist" crouched alone in a dusky lab, team competitions such as Science Olympiad emphasize the excitement of advanced learning through active, hands-on, group participation.



'94 Science Olympiad National Champions: State College Area Junior High School Team Members, Alternates, and Coaches. Photo by Cathy Seith

Science Olympiad

by Danny Yavuzkurt

Feeling your heart beat and your breath shorten as you frantically scramble to complete a precise graph of the complex relationships among dewpoint, temperature, and humidity in the atmosphere, while having your own problems with humidity around your sweating temples, as time is running out, and you've still got the weather prediction analysis to do . . .

• • •

Carefully, slowly adding sand to a bucket that is connected to a bridge you've made of flimsy balsa wood, and knowing you're above your limit and any moment now your bridge will explode in a shower of splinters and glue, ending your shot at the gold medal in this event . . .

• • •

Racing across the sodden turf, cradling a bulging water balloon in your arms as you attempt to recall the name of the largest mammal in Pennsylvania, while your teammates wait excitedly for the handoff and the race to possible glory in the Pentathlon . . .

• • •

Orienteering as fast as you can around an unfamiliar campus with only a compass, a set of clues and directions, your knowledge of plants in the Northeast U.S., and your determined attitude to guide you . . .

It's moments like these that best characterize the spirit of the Science Olympiad—the spirit of reaching your limits and surpassing them.

Just meeting that personal challenge can be thrilling enough. But beyond that, there's the chance that you may earn first place in your chosen events and give your team the chance to win the tournament and advance to the next round of competition. Eventually, you may even get a shot at the prestigious national title, and gain glory for yourself and your school.

Last year I was fortunate enough to be a member of the Pennsylvania team, State College Area Junior High School, that won the national championship in the Science Olympiad junior high/middle school division. Of course, winning felt great, but just competing in the national tournament was the experience of a lifetime.

Being with all the best teams in the nation and knowing what we were up against was excitement enough. In addition, we enjoyed the exhilaration of being in a faraway state, at a competition we had been invited to attend because we had proven we were good enough to compete. Being there was overwhelming.

The Science Olympiad is an annual competition that now involves more than twelve thousand schools nationwide. Students in the younger divisions (grades K-3, 3-6) compete primarily at the local and district level; older students (grades 6-9, 9-12) are eligible for more extensive competitions at the regional, state, and national levels.

Each team is made up of a maximum of 15 students, and each member of the team may compete in a different event or events. There are 32 individual and team events to choose from, in biology, earth science, chemistry, physics, problem solving, and technology. Some mainly involve test-taking, some mix athletics with science knowledge, and some require the building and testing of a structure. If you win, you are presented with a medal at the awards assembly, and championship trophies go to the teams compiling the highest point totals. The system is basically the same as in the Olympic Games.

The national tournament, which is held in a different state every year, took place last May at the University of Arizona in Tucson. Fifty-two of the best teams from around the nation competed fiercely, but still maintained the principles of good sportsmanship and teamwork, which are integral parts of the Olympiad.

Participating in and winning the Science Olympiad was one of the most wonderful and fulfilling experiences of my life. Being on the national championship team, winning two national gold medals (Weather or Not and Earth Science Process Lab), and afterward being invited to address the Pennsylvania state legislature, all left me with an incredible, unforgettable feeling. Through my own hard work and the dedication of my fellow team members and coaches, regularly putting in extra hours throughout the year, we had truly reached our full potential. It's a feeling money can't buy, knowing you accomplished something because you stuck with it and *made* yourself do it. Yes, that's what the Science Olympiad is all about. ■

Science Olympiad
(teams) **Grades K-12**

The 1995 national tournament of the Science Olympiad will be hosted this May by Indiana University-Bloomington; the 1996 tournament will take place at Georgia Institute of Technology in Atlanta.

Registration deadline: Fall deadlines vary by state; write for information on state contacts.

Science Olympiad, 5955 Little Pine Lane, Rochester Hills, MI 48306. (810) 651-4013

*Now a 10th grader, **Danny Yavuzkurt** loves to ski, sail, read, and draw. In addition to his Science Olympiad experience, Danny also competed with the ten-member 9th grade Knowledge Masters team that finished second in last spring's national open competition.*

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COMPUTER SCIENCE COMPETITIONS

Combining the Art of Problem Solving with the Skill of Computer Programming

'94 USA Computing Olympiad Finalists at UW–Parkside with staff, including Dr. Don Piele (front row center).

International Computer Problem Solving Challenge

(individuals) **Grades 4-12**

The ICPSC is designed for students of all abilities, from beginning to advanced, who compete in three divisions based on grade and age. On the last Saturday in April, local coordinators supervise sites around the world where students have three hours to create short, original solutions to five computer problems using any programming language. Problem categories include computation, stimulation, graphic patterns, words, and mind benders.

Programs and output from students who solve all five problems correctly are then sent to ICPSC for evaluation and awards.

Registration deadline: April 1, 1996

Dr. Donald T. Piele, ICPSC, P.O. Box 085664, Racine, WI 53408; (414) 634-0868, fax (414) 595-2056; e-mail: piele@cs.uwp.edu

USA Computing Olympiad

(individuals, U.S. citizens only) **Grades 9-12**

Because the USACO is highly competitive, students who have participated for a few years in the American Computer Science League Contests or the International Computer Problem Solving Competition have a better chance of success in this contest.

The initial Qualifying Round, held at schools in February, requires individual students to program solutions to four or five computer problems without strict time limits. The source code for the programs must be submitted on a Macintosh or IBM-compatible disk; students must use one of the official languages allowed by the International Olympiad in Informatics: Pascal, C/C++, or Quick Basic. Those who correctly solve two or more problems qualify for the five-hour, one-problem Competition Round, held in March.

The twelve to sixteen students with the highest scores nationally are invited to attend a week-long training session and Final Round at the University of Wisconsin-Parkside in June. During that time, four students and one alternate are chosen to form the U.S. team to the international Olympiad in Informatics (IOI).

Registration deadline: January 1996

Dr. Donald T. Piele, USACO Director, University of Wisconsin-Parkside, Box No. 2000, Kenosha, WI 53141-2000; (414) 595-2231; fax (414) 595-2056; e-mail: piele@cs.uwp.edu

For more information on science competitions, check your bookstore or order directly from the publisher:

Freed's Guide to Student Contests and Publishing
by Judith M. Freed (5th edition, 1994; $13.95, plus $2.00 shipping). Available from Fountainpen Press, 218 West Fountain Avenue, Delaware, OH 43015-1656.

Student Science Opportunities
by Gail L. Grand (1994, $14.95). Available from John Wiley & Sons, Inc., #1 Wiley Drive, Somerset, NJ 08875; (800) 225-5945 x2497.

Science & Math Events: Connecting & Competing
($4.00, plus $3.75 shipping and handling)
Science Fairs and Projects
(Grades K-8 or 7-12; $9.50 each, plus $3.75 for shipping and handling)

Both available from National Science Teachers Association, 1840 Wilson Blvd., Arlington, VA 22201; (800) 722-6782.

International Olympiad in Informatics

(invitation only)

Last July 3-10, Sweden hosted over 180 students from 48 countries for the Sixth IOI. The U.S. fielded one of only five teams whose members each won a medal: Mehul Patel (gold), Brian Dean (silver), Hubert Chen (bronze), and James Ayers (bronze).

U.S. team members are chosen based on their performance in the USA Computing Olympiad in March and the training program in June.

The Seventh IOI will be held June 26-July 3, 1995, in the Netherlands. To encourage more young women to participate, this year's teams will be permitted to expand their membership to five if at least one team member is a female.

ACSL Computer Science Contest

(school teams only; no individuals) **Grades 7-12**

School teams of three or five members participate in four competitions during the academic year against teams in their division across the country. Those scoring in the top 15% are invited to attend the All-Star national competition on Memorial Day weekend. Winners receive prizes that include computer equipment and computer-related books. The national site varies; this year's event will be held in Houston, Texas.

Registration deadline: December 1, 1995

American Computer Science League, P.O. Box 40118, Providence, RI 02940; (401) 822-4312.

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Science Test Competitions

Pitting Your Knowledge against Others', Nationally and Internationally

Flanked by their coaches, '94 U.S. team to the IPhO (l to r): Daniel Schepler, Andrew Frey, Geoffrey Park, Charlene Ahn, Andy Neitzke.

U.S. National Chemistry Olympiad

(nomination only; U.S. citizens) **Grades 9-12**

Each April, about ten thousand outstanding chemistry students identified by local sections of the American Chemical Society take a four-hour exam of multiple choice and essay questions. In June, about twenty of the highest scorers travel to the U.S. Air Force Academy in Colorado Springs for a two-week study camp of lectures, problem solving exercises, lab work, and testing. Four of these students are then chosen to form the U.S. team that competes in the International Chemistry Olympiad.

USNCO, Education Division, American Chemical Society, 1155 16th Street, NW, Washington, DC 20036; (202) 872-6328.

International Chemistry Olympiad

(invitation only; U.S. citizens)

During the 26th IChO held last July 3-11 in Oslo, Norway, teams from about 40 countries gathered to compete for the world title. Repeating their 1993 success, the U.S. again finished in the top three, along with the People's Republic of China and the United Kingdom. For their performances on the laboratory and theoretical exams (five hours each), all four U.S. team members won medals: Jessen Yu (gold), Justin McCarty (gold), Nicholas Loehr (silver), and James Grimmelman (bronze).

Next year's IChO will take place in Beijing, People's Republic of China.

National Academic Team Challenge (Sciences)

(schools) **Grades 9-12**

The Foundation for Scholastic Advancement sponsors six academic competitions during the school year. Team formats are used for math, English, and history; however, in the three sciences, individuals take 45-minute exams in school:

- *Biology*—cell organelles and function, photosynthesis, plant and animal physiology, reproductive biology.
- *Chemistry*—equilibria, gas laws, electrochemistry, acids and bases, nuclear chemistry, atomic structure, history of science.
- *Physics*—kinematics, rotational motion, universal gravitation, energy, collisions.

The top five scores from each school are entered into a national database for competition against other participating schools. This year's science exams will be administered April 3-14.

Registration deadline: Call next fall for 1996 dates.

Foundation for Scholastic Achievement, P.O. Box 3340, Iowa City, IA 52244; (312) 464-4812.

International Physics Olympiad

(invitation only; U.S. citizens)

U.S. participation in the IPhO is organized by the American Association of Physics Teachers and the American Institute of Physics. Teachers across the country are invited to nominate their best physics students for the first qualifying exam in February. The top scorers are then invited to take another, more difficult exam in March. Those who score in the top 20 on the second exam attend a training camp, at which the five-member IPhO team and one alternate are chosen.

Last July in Beijing, People's Republic of China, the U.S. physics team achieved their highest team finish ever, placing third after China and Germany. The five Americans competed against teams from 46 other countries in two day-long physics exams. Because Chinese grading methods were unusually strict, most teams' overall score was lower than in previous years, with only six gold medals, five silver medals, and 22 bronze medals awarded to the 229 competitors.

Team members Andrew Frey (ranked 15th overall), Daniel Schepler (16th overall), and Andy Neitzke (25th overall) received bronze medals; and Geoffrey Park (50th overall) received an honorable mention. Charlene Ahn (82nd overall) and all other team members won special medals for their work on either the theoretical or experimental exams. The team alternate was Paul Lujan.

This year's IPhO will be held in Australia.

American Association of Physics Teachers, One Physics Ellipse, College Park, MD 20740-3845; (301) 209-3344; fax (301) 209-0845.

JETS-TEAMS

(teams) **Grades 9-12**

The Tests of Engineering Aptitude, Mathematics and Science (TEAMS) is a one-day, two-part program held at universities around the country in February and March. Student teams complete a multiple-choice test of objective engineering questions (ranked by region and state), then solve open-ended, subjective problems (ranked nationally) related to the first part of the test. JETS mails information to schools in the fall.

Registration deadline: Varies; set by host university.

JETS-TEAMS, 1420 King Street, Alexandria, VA 22314-2794; (703) 548-5387, fax (703) 548-0769, e-mail: jets@nas.edu.

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RESEARCH INTERNSHIPS

A Perspective on the Professional World of Science and Technology

Programs that provide precollege students with an expanded knowledge of science and its applications to the real world are abundant and varied. Academic programs, enrichment classes, and math and science competitions are among the many worthwhile opportunities available to those preparing for careers in science and technology. Some students, however, yearn to go beyond academia and contests to gain practical experience in these fields. If you're someone who's looking for intensive hands-on learning in the skills fundamental to a career in science, an internship may be just right for you.

As an intern, you interact with seasoned scientists and researchers in a professional environment. You get a taste of responsibility under the guidance of a mentor who is usually a faculty professor with graduate and postgraduate students. Working in the facilities of your mentor, you may join an on-going research project team or initiate your own independent study. Internships not only can stimulate your interest in a particular field, but also may lead to job offers after you complete your education.

Selected science and technology internships listed here are available to rising 10th, 11th, *and/or* 12th graders. Programs—some with on-site housing; some for commuters only—vary in length from two to eight weeks during the summer. Depending on project funding, some are free, while others require a fee from the student. All of the internships listed offer some form of financial assistance, and several pay student stipends. Although certain deadlines have already passed for this summer, you may want to confirm that those slots are in fact filled. And start planning now for next year. Call or write for more complete information. ■

Brandeis Summer Odyssey Science Research Internships
(eight weeks)
Rabb School
Brandeis University
P.O. Box 9110
Waltham, MA 02254-9110
(617) 736-3424
Application deadline: April 1

Early Experience Program: The Making of an Engineer
(three weeks)
Pamela Campbell
Bureau of Educational Services
University of Denver
203 Wesley Hall
Denver, CO 80208
(303) 871-2663
Application deadline: May 1

High School Honors Science Program: Research Internship
(seven weeks)
Dr. Gail Richmond
Michigan State University
330 Erickson Hall
East Lansing, MI 48824-1034
(517) 353-2958
Application deadline: April 1

Interdisciplinary Program in Biological Sciences with Emphasis on Research
(six weeks)
Rick Pomeroy
Division of Education-Science
University of California-Davis
Davis, CA 95616
(916) 752-0622
Application deadline: March 31

NIH Summer Internship
(eight weeks)
National Institutes of Health
Office of Education
10 Center Drive, MSC1158
Bethesda, MD 20892-1158
(310) 496-2427
Application deadline: March 31

Research in Science at Erskine (RISE): Scientific Application of Technology
(four weeks)
Dr. William Junkin III
Department of Chemistry & Physics
Erskine College
Due West, SC 29639
(803) 379-8822
Application deadline: May 15

Science and Engineering Honors Programs
(six weeks)
Send self-addressed, stamped envelope to:
Dr. George Zimmerman
Physics Department
Boston University
590 Commonwealth Avenue
Boston, MA 02215
(617) 353-2189
Application deadline: May 1

Science Technology and Research Summers (STARS)
(three weeks);
Summer Opportunities and Research for Space (SOARS)
(two weeks)
Dr. Richard Devon, Director
PA Space Grant Consortium
The Pennsylvania State University
101 South Frear Laboratory
University Park, PA 16802
(814) 863-7688; fax (814) 863-8286
Application deadline: March 17

Secondary Student Training Program (SSTP); Research Participation Program
(six weeks)
Office of the Provost
111 Jessup Hall
University of Iowa
Iowa City, IA 52242
(319) 335-0040
Application deadline: March 15

Summer Research Program for High School Students
(eight weeks)
Dr. Clifford Houston
Office of Multicultural Affairs
University of Texas Medical Branch
Galveston, TX 77555-1019
(409) 772-0135
Application deadline: April 3

Summer Research Training Program
(six weeks)
Dr. Dudley Cox
Department of Biological Sciences
Pace University
1 Pace Plaza
New York, NY 10038
(212) 346-1895
Application deadline: Call for information.

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Limited to Residents of State/Region:

Apprenticeships in Science and Engineering (ASE)
(eight weeks; students in Oregon and southern Washington State)
Paige Kuni
Saturday Academy
Oregon Graduate Institute of Science & Technology
P.O. Box 91000
Portland, OR 97291-1000
(503) 690-1190/1419
Application deadline: January 26

Committee for Advanced Science Training (CAST) Research
(ten weeks; California residents)
Yoshi Yamasaki
California Museum of Science and Industry
700 State Drive
Los Angeles, CA 90037
(213) 744-7444
Application deadline: Early February

Discovery
(five weeks, NJ residents)
Monica Taylor, Director
Office of Academic and Student Affairs
Martin Hall, Cook College
New Brunswick, NJ 08903
(908) 932-9650
Application deadline: March 5

New York State Summer Institute for Science, Mathematics, and the Arts
(three weeks; NY residents)
State Education Department
Room 981 EBA
Albany, NY 12234
(518) 474-8773
Application deadline: April 1

Summer Research and Apprenticeship Program in Science and Mathematics
(five weeks; residents of Northeastern states)
Program Director
Clarkson University
Box 5800
Potsdam, NY 13699-5800
(315) 268-2342
Application deadline: March 15

For Minorities and/or Young Women:

Exploring Career Options in Engineering and Science (ECOES)
(two weeks; women only)
Kathleen Bott
Office of Women's Programs
Stevens Institute of Technology
Castle Point on the Hudson
Hoboken, NJ 07030
(201) 216-5245
Application deadline: May 10

Smith Summer Science Program
(four weeks; women only)
Dr. Gail Scordilis
Clark Science Center
Smith College
Sabin Reed #435
Northampton, MA 01063
(413) 585-3879
Application deadline: June 1; for early admission, March 1

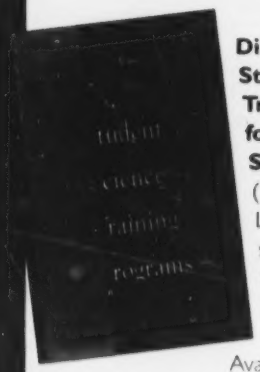
Summer Engineering Academy (SEA): Summer Apprenticeship Program (SAP)
(eight weeks; minorities only)
Minority Engineering Program Office
University of Michigan
2316 EECS Building
1301 Beal Avenue
Ann Arbor, MI 48109-2116
(313) 764-6497
Application deadline: April 30

DOE National Laboratories

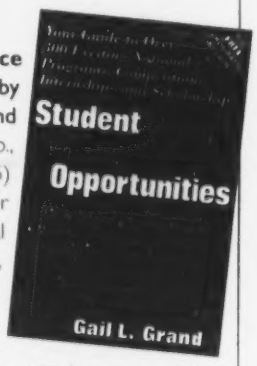
This summer, the U.S. Department of Energy (DOE) National Laboratories will offer a two-week Honors Program Summer Internship for rising 12th graders at four sites: Argonne National Laboratories in Argonne, Illinois; Fermi National Accelerator Laboratory in Batavia, Illinois; Lawrence Berkeley Laboratory in Berkeley, California; and Sandia National Laboratories in Albequerque, New Mexico.

Applications for these internships are available from, and are processed through, your own State Department of Education; the deadline is April 3. Four students are selected from each state.

For information on many more internship opportunities, consult these guides:



Directory of Student Science Training Programs for Precollege Students
(1994, 61 pp., $3.00)
Listings, by state, of summer study and internships, including NSF-funded Young Scholar Programs. Available from Science Service, 1719 N Street, NW, Washington, DC 20036; (202) 785-2255.



Student Science Opportunities, by Gail L. Grand
(1994, 292 pp., $14.95)
Descriptions of over 300 national programs, competitions, internships, and scholarships (including 100 free programs). Available from John Wiley & Sons, Inc., #1 Wiley Drive, Somerset, NJ 08875; (800) 225-5945 x 2497.

Prentice Hall Guide to Scholarships and Fellowships for Math and Science Students
(1993, 312 pp., $19.95)
Includes a section on internships and summer employment for students pursuing careers in mathematics, science, and engineering. Available from Prentice Hall, Career & Personal Development, Englewood Cliffs, NJ 07632; (800) 544-4565.

Research Science Institute

Combining Academic Stimulation with Intense Socialization

by Lauren Williams

The annual Research Science Institute (RSI), founded in 1984, is a free six-week summer program sponsored by the Center for Excellence in Education and offered in collaboration with MIT. Each year, about 50 rising 12th graders (with an occasional 11th grader) from the United States and 10 students from abroad are selected to live in Cambridge and work with mentors from MIT, Harvard, or Boston University on projects suitable for submission to the Westinghouse Science Talent Search. RSI selection is based on PSAT scores, high school transcripts, teacher recommendations, and personal essays.

Last summer, I had the opportunity to attend RSI, where I spent the most incredible six weeks of my life. The program was outstanding in both its academic and social aspects, offering a variety of unique experiences.

First, Mini Classes

RSI's program is divided into three parts, the first of which is a week of excellent mini classes with interesting and entertaining teachers. We took four courses: two science classes, such as nuclear physics and computer-based math; a humanities class, in which we studied *Crime and Punishment*; and a computer class, where we were introduced to the MIT Athena computer system and given our own e-mail accounts.

Then, the Mentorship

The second part, the four-week mentorship, was the core of the program. Everyone had a different project of his or her own choosing, with an assigned mentor. Fields of study included such diverse topics as the magnetic activity in giant stars, top quark, purification of lysyl oxidase, parallel implementation of Picard's iteration, neural networks, and computer-generated holograms. I studied self-avoiding random walks, a topic in combinatorial math, with Satomi Okazaki, who is a graduate student in mathematics at MIT.

Each of us went to "work" five days a week, 9 a.m. to 5 p.m., working individually or meeting with our mentors to go over the previous day's work. I usually met with my mentor for about an hour, then spent the rest of the time in the computer clusters or in the math lounge with the other math students.

Although at first I was skeptical as to how I could spend a month on one math problem, I soon realized how involved the research was. In the course of my study, I learned about generating functions, random walks, and *Maple*, a math software program that can perform complex calculations. Through a three-day crash course in C given by knowledgeable friends and teaching assistants, I also gained a sufficient understanding of the computer language to write a program to generate data for my research.

At times the research was extremely frustrating, and I felt I was going nowhere. One day I came up with a (false) proof that solving my problem was impossible. Another day I dreamed I had solved the problem—then woke up, having forgotten how. But the small discoveries that I did at last make brought me indescribable exhileration, making all the frustration worthwhile.

And Finally, "Hell Week"

The third part of the program was a stressful seven days in which everyone recorded his or her research in a twenty-page paper and gave an oral presentation. Many of us pulled all-nighters in the computer clusters, typing away frantically, encouraged by the TAs who were always willing to help us find the right word or bring us cookies and chocolate-covered coffee beans at 2 a.m.

But once the papers were turned in, we could relax and enjoy the oral presentations of our peers. Many of these outstanding projects were submitted to the Westinghouse Science Talent Search, and it is a tribute to RSI that 16 of this year's 300 semifinalists and 8 of the 40 finalists are RSI '94 alumni.

Time for Fun, Too

Although we spent the majority of our daylight hours working, at night we sacrificed our sleep for socialization, an integral part of RSI. Our friendships grew through late-night talks in the 24-hour coffee shop, chess and bridge games, musical ensembles playing Bach and Pachelbel, ten-person pyramids (I got to be on top and crash down on everyone else), Capture the Flag, and 3 a.m. explorations of the rooftops and underground passages of MIT.

Weekend activities included a hike in the White Mountains and an overnight stay at a nearby hotel, where about 20 of us crammed into one room for a talk-and-haircutting party. The next morning, I hiked a mere 100 feet before falling asleep on a comfortable rock. We also enjoyed whale watching in Boston Harbor, the Boston Pops 4th of July concert, "Phantom of the Opera," tango lessons, going into Boston via the "T," the traditional Ultimate Frisbee game against PROMYS (a summer math program at Boston University), and a talent show, which included a torch juggling exhibition and a rendition of *Jabberwocky* in Polish.

An Experience I Wished Could Last Forever

Coming from about 35 states and 8 countries outside the U.S., the 60 RSI students were the most diversely talented group I have ever met. While I was a little intimidated at first, that feeling soon disappeared, and hearing about other students' academic endeavors only inspired me.

The day I left RSI was one of the saddest of my life because I thought it would be impossible to stay in touch with the many friends I met there who would now be scattered around the world. To my joy, however, many of us have been able to communicate via e-mail, as well as to participate in an on-line RSI chat group twice a week. About 40 of us also reunited for an overnight holiday party at the home of the RSI director, Mrs. DiGennaro (affectionately dubbed "Mrs. D"), to share yet another crazy, sleepless night together.

RSI is a fabulous program, and I encourage anyone with a love of science to apply. ■

***Lauren Williams** is an 11th grader at Palos Verdes Peninsula High School in California. In addition to her interest in math, Lauren also enjoys physics, computer science, playing the violin, and writing poetry.*

For more information about RSI: Center for Excellence in Education, 7710 Old Springhouse Road, McLean, VA 22102; (703) 448-9062, fax (703) 442-9513; e-mail: cee@access.digex.net

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Putting Your Summer Job to Work

by Edwin Foo

Last summer I worked as a lab assistant/technician at the Texas Center for Superconductivity at the University of Houston (TcSUH). My experiences there benefited me greatly, and I gleaned useful tidbits of wisdom from being part of a real-life research lab for three months and putting my knowledge to practical use. In the process I realized that many important skills in life cannot be learned from books or summer programs and that, in order to use your talents and skills effectively, you must learn to *apply* them and not just regurgitate verbatim what you have read in a textbook.

I became involved with TcSUH because scientists from the University of Houston who had acted as science fair judges had viewed prize-winning projects of mine. When he heard that I had been accepted one year early into MIT, Dr. Wei-Kan Chu, a physics professor and deputy director of research at TcSUH, offered to take me on a tour around the lab. He asked what I was doing for the summer and, when I said I was looking for a job, he offered me a position as a lab assistant. Of course, I accepted.

I started two weeks after school ended, but did not get much work done the first few days. Being hired by a state-funded institution requires a slew of paperwork, and I was nearly swamped by the number of forms. When I was not signing forms or trudging across campus to get them, I found out that my job assignment was to work with the Applications Group, a research lab whose goal is to find commercial applications for superconductors. My duties were purposely kept vague; I had free rein to work on any project I found interesting. This kind of flexibility is what I found most attractive about the job.

Designing a Flywheel Simulation

My first month's project was directly related to the research and development effort going on within the Applications Group, developing an energy-storage system that would use magnetically levitated flywheels. Flywheel energy-storage systems have advantages in their inherent simplicity and ease of operation, along with their compact size compared with banks of batteries or other storage devices. However, flywheels are enormously inefficient because they lose large amounts of kinetic energy through friction with the drive shafts as they rotate.

The flywheel under development by TcSUH uses superconducting magnets to levitate the flywheel and hold it in place, thereby eliminating friction altogether. Such a flywheel could theoretically keep spinning forever in a vacuum. A prototype built by TcSUH has been able to spin continuously for twelve hours and only lose 0.10% of its original kinetic energy.

However, in order for the flywheel to store energy amounts high enough for commercial use, it must spin at much higher rpm than it currently does. At higher rpm, new problems with vibration and structural fatigue appear, and it is essential that the flywheel be designed with those problems in mind. I worked on a computer simulation of the flywheel at high rpms to predict the behavior of the disk as it rotated.

Before working at TcSUH, I generally wrote computer programs as I saw fit. Since I was the only person using the programs, I could design them according to my own specifications. At TcSUH, I learned how challenging it can be to design software for other people to use. What they have in mind and what you have in mind are often quite different, and a great deal of discussion is needed merely to establish outlines of what the program should do and look like.

This was a learning experience for me, as I was dealing with scientists who simply wanted to get work done and were not necessarily as computer literate as I. So I learned how to program for the real world, a skill no book can teach.

Configuring a LAN

My other major project at TcSUH was the installation and running of the lab computer network. Before I came, there were several computers in the lab performing various tasks, but they were not connected. As a result, sharing data between different labs or computers was quite difficult and time consuming.

The solution I proposed was to set up a Local-Area-Network (LAN) to connect all the computers directly. Then different staff members could share files, data, and thoughts more quickly and efficiently, so they could spend more time doing research instead of computing.

The project was quite exciting because, working alone, I was responsible for every aspect of the system—from writing specifications and soliciting bids from equipment manufacturers to actually installing and configuring the network.

More than anything else, this project taught me the importance of careful organization and planning. And being responsible for thousands of dollars' worth of computer hardware and software purchases taught me the value of caution.

What You Can and Cannot Learn from a Book

Working for TcSUH turned out to be much more than a way to get paid for my computer programming skills. The lessons I learned will carry over into all areas of my life, as I study here at MIT and later when I enter the work force. Again, such lessons cannot be taught; you must learn by doing. And also learn from your mistakes and from the advice of older, more experienced people.

Another important message: Having incredible technical knowledge will not guarantee you success in life; people skills and common sense are also essential. Many people in technical professions have neglected to acquire these skills and regret it later when they find themselves with bosses who have little or no technical experience, but bigger paychecks. (There is a saying at MIT: "An MIT engineer gets the breakthrough, and his Harvard boss gets the raise.")

Working at TcSUH last summer was a fun, intellectual, and unforgettable experience for me. I intend to continue working summers as I go through college, and I have already begun my job search for this year. Working in the real world is always a learning experience—and experience counts when you apply for other jobs. ■

***Edwin Foo** (15) is a freshman at MIT, with plans to pursue both a Ph.D. in computer science and an MBA. His fondness for taking things apart to decipher their innards caused his parents great grief when he was still too young to put things back together. Edwin is also an accomplished musician who has won many piano and violin competitions. He enjoys MIT tremendously and describes it as "the only school on earth where being worked to death is a graduation requirement."*

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VENTURING INTO WONDERLAND

Of MOOs and MUDs and Mailing Lists

by Kimberly Nolan

To explore whole worlds you never even knew existed, all you need is a computer, a modem, and an e-mail account. Once you're hooked up, let yourself tumble down Alice's rabbit hole and into the Internet Wonderland.

Not getting dizzy—that's the tricky part. Wandering into this new someplace-space of Gophers, Webs, IRCs, and URLs, you're apt to suffer from information overload, not to mention acronymophobia. You may feel like Alice reading "'Twas brillig, and the slithy toves . . ." in *Jabberwocky*: "It seems to fill my head with ideas—only I don't exactly know what they are!"

Not to worry; this Wonderland is user friendly. (No Red Queen shouting, "Off with her head!") Once you have the equipment, a few simple directions—in plain English—will ease your way.

A Luddite at the Mad Hatter's Tea Party

I grew up with Etch-a-Sketch, not Macintosh, so this Looking-Glass didn't melt away like gauze for me. Seven years ago, I didn't even know how to use a computer—I barely knew how to type—but I realized I had to learn. Fast.

Yet, if you'd mentioned the Internet to me then, I would have smirked and said, "Never!" Although I readily acknowledged the advantages of word processing over two-fingered typing, I was leery of on-line, interactive technology. As an English major, I felt that most of it didn't apply to me.

I wasn't alone, of course; proponents of the Information Age call dissenters like me "Luddites," after a group of early 19th-century British workers who tried in vain to turn back the tide of the Industrial Revolution. I saw the computer as a necessary, but dehumanizing, machine—not realizing the Internet's vast potential to bring people together.

My conversion from Luddite to technophile came two years ago when I was in graduate school. Some of my friends were talking about how much fun it was to do research through an *electronic mailing list*, an open-ended discussion group that takes place on the Internet on a central theme or topic. They were cutting their library time in half (they claimed) and were discovering new sources just by reading through the messages posted to the list. Best of all, list members were eager to share knowledge: for example, a question about where to find an obscure, out-of-print, critical edition elicited several responses. One generous person who owned a copy even offered to mail the text to the student who had requested the information(!).

I was skeptical. Graduate students are prone to exaggeration; electronic conferencing sounded too much like a fantasy of the hookah-smoking Caterpillar. "Just get on-line and someone, somewhere will know the answer to every question you could possibly want to ask!"

While I was skeptical, I was not foolish. I knew that I needed to take advantage of every available resource if I was going to succeed in graduate school. So, as an Internet novice looking for a non-threatening place to start, I asked a friend to print out some preliminary information about signing on to a mailing list.

Thousands of these lists exist on the Internet. Via e-mail, members send comments to the list address, and their messages are reflected back to every list member. (Imagine the list address as a communications satellite, collecting bits of information and beaming them back to Earth.) Just by signing on to a particular list, you can converse in Klingon, chat about "The X-Files," or compare the texts of *King Lear*. List membership is free, and most lists are open to anyone with an e-mail account.

There are two basic kinds of mailing lists: *moderated* and *unmoderated*. I prefer the moderated lists, because they each have an editor who reviews all the messages, deleting those that don't belong or might have been written as a hoax. The editor then groups all the shorter messages into several longer ones, so that, instead of fifteen individual messages, you might receive three long digests. If you're being charged per message for your e-mail account, you'll be thankful for this feature.

Most editors of moderated lists also send new members "welcome" messages that explain the list's mission, go over list protocol, and provide guidance. The editor can help beginners navigate through the language of electronic mail and mailing list software, eliminating confusion and cutting down on the intimidation factor.

Lurking like the Cheshire Cat

I have to be honest. Even after I had the information, it took a while before I got up the courage to sign on to SHAKSPER, the list I was most interested in joining. And it took even more time—and more courage—to ask a question by e-mail.

SHAKSPER, as you might guess, is an electronic conference devoted to Shakespeare studies, and prominent scholars contribute to the discussions that take place every day on my computer screen. In fact, the very same people whose articles I was reading for class were talking by e-mail about everything from the reconstruction of the Globe theatre, to the different texts of the closet scene in *Hamlet*, to Kenneth Branaugh's film version of *Much Ado about Nothing*. Feeling somewhat in awe at first, I was content to lurk.

Lurking—reading all the mail posted to the list without actually entering into the discussion—is perfectly acceptable, and many list members regularly lurk. In fact, if the 1,000-plus members of SHAKSPER all participated in the discussion every day, the volume of mail would be impossible to keep up with.

No Longer the Dormouse in the Teapot

Now I start my days with coffee and the Internet. (In fact, when I'm away from my computer, I go into withdrawal.) I subscribe to four electronic mailing lists and use them every day for work and pleasure. Yes, I do appear on line.

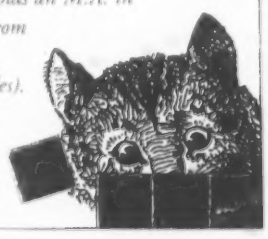
Looking back, I can see it was good that I waited and got to know the list's "character." I learned, for instance, that concise messages are more likely to get responses than are long, philosophical musings. I learned the importance of restating which part of the discussion you are responding to, since several parallel conversations often take place at once.

And I learned that a mailing list, while a wonderful resource, is still not a replacement for a library and a couple hours of good detective work. At least, not yet. ■

To find a list you'd like to join, check your library for a "list of lists," either on-line or in a hard-copy catalogue. Or dial up the Gopher at the Library of Congress (see p. 13), and browse through their collection of lists. When you find one that interests you, send a one-line message to the LISTSERV address:

subscribe [list name] [your first name] [your last name]
Example: subscribe SHAKSPER Kimberly Nolan

Kimberly Nolan *holds an M.A. in English Literature from the University of Miami (Coral Gables). She is an Assistant Coordinator for Academic Programs at CTY.*



It's 2:00 a.m., and you're working late on a research paper. You need to confirm a point about the political structure in Madagascar, or check out an experiment conducted on the latest Space Shuttle flight, or add a quote from a Carl Sandburg poem. Of course, the library is closed.

Don't panic. Just hop on the Internet.

THE NETWORK OF NETWORKS *Something for Everyone*

by Shawn Downing

You've heard that there's a wealth of options out there on the Internet, just waiting for you to log on. You may already be using it to e-mail your friends. But the possibilities of Internet go way beyond avoiding snail mail.

At any time of the day or night, you can use the Internet to access information resources such as government documents, books in the public domain, graphic still images, video clips, or sound files. You can link up with discussion groups on just about any topic you can imagine (and some you've never thought of). You can even find games and software available for downloading (legally). If you're a novice, what you need to help you get started is a guide.

The Internet Gopher

On the Internet, guides are known as *information servers* and come in a variety of formats, including Gopher (a menu-based system) and World-Wide Web (a hypertext-based system).

Although World-Wide Web is rapidly gaining in popularity and technical variety, I've chosen to write about the Internet Gopher because it's easy to use and will work for *anyone* with a modem and any computer—Mac, Apple, Amiga, or PC. (To use World-Wide Web, you need Windows, a hard drive, and extra memory.)

Another plus: No matter which gopher server you reach, the menu will have a consistent format. You can be browsing through information that's located on IBM host mainframes, on PC clones running Windows or OS/2, on Macintoshes or Unix workstations. But as long as you've accessed them through a gopher server, all the menus from whatever site will have the same commands.

You may be able to connect with the Internet through a system at your school or local library. Or you may choose a commercial Internet provider, such as Prodigy, America On-Line, or Delphi. (If so, you'll follow their usage instructions.)

JHUniverse

Another option is to dial into the Gopher provided as a free service by The Johns Hopkins University. Primarily designed to acquaint prospective students with our campus, JHUniverse also allows you to retrieve information resources by linking up with gopher servers around the world. No, you don't need your own Hopkins e-mail account, and you pay only the telephone charges between your computer and JHU. Then you sail off to Paris or Timbuktu at no extra charge.

Note: JHUniverse operates in *view only* mode: you can only read or print what's on the screen. (Other means of accessing Gopher allow you to download text files, software, or images.)

Let's try it. With the communication setting of 14.4 baud, 8-n-1, dial up (410) 516-6666. Once you're connected to JHUniverse, you'll see a menu on your screen. No matter where you go at any level, the rules remain the same:

1. Menu items that end in / indicate directories that lead to more directories or files.
2. Menu items that end in . indicate files that can be read.
3. Use arrow keys to navigate.
4. Press **Enter** or **Return** or the right arrow key to open a directory or file menu listing.
5. Press **u** or the left arrow key to go back up a level.
6. Press **m** to return to the JHUniverse menu screen.
7. Press **q** to quit.

Before we continue, you may want to sample some news about our university. You can even catch up on what's happening at CTY by scrolling to **Divisions, Centers, and Affiliates/**, then to **Center for Talented Youth/**.

Okay, now hit **m** and come back to the JHUniverse menu. Move down to **Into the Internet!/**; then choose either **Information Services in the United States/** or **Information Services around the World/**. Remember, the / at the end of the line indicates that this is a directory to lower levels. Within these directories, you may now choose a state or a country, then look at their directories. Just move around checking out topics, and eventually you will come to the level that includes a file to read.

For example, to check out electronic mailing lists around the world, call up **Information Services in the United States/**; **Washington, D.C./**; **Library of Congress/**; **Global Electronic Library (by Subject)/**.

That's really all there is to it.

Just to tantalize you, here's a small sampling of available sources, including the organization's name, location, gopher address (which can be used for direct access), and menu notes:

- **American Mathematical Society (e-math.ams.com)** *Samples:* Mathematical Publications and Preprints, Professional Information, Mathematical Sciences Meetings and Conferences, National Science Foundation Gopher, Swarthmore Geometry Forum.
- **Biodiversity and Biological Collections, General (muse.bio.cornell.edu)** *Samples:* Museum, Herbarium, and Arboretum Collections; FishGopher Project; Journals and Newsletters; Software; Biological Images.
- **Clearinghouse of Subject-Oriented Internet Resource Guides, Michigan (una.hh.lib.umich.edu)** Guides to Humanities, Sciences, and Social Sciences.
- **Go M-Link, University of Michigan (vienna.hh.lib.umich.edu)** *Samples:* Business & Economics, Computers & Technology, Government & Politics, Health & Nutrition, Libraries & Librarianship.
- **Internet Wiretap, California (wiretap.spies.com)** *Samples:* Government Documents (U.S. & World), Electronic Books (books in the public domain).
- **NASA Spacelink Project, Marshall Space Flight Center, Alabama (spacelink.msfc.nasa.gov)** *Samples:* Educational Services, Instructional Materials, NASA News and Projects.
- **RiceInfo, Rice University, Texas (riceinfo.rice.edu)** *Samples:* Anthropology & Culture, Astronomy & Astrophysics, Engineering, Environment & Economy, Film and Television.
- **The Well, California (gopher.well.com)** *Samples (with a California twist):* Art, Music, Film, Cultural Works; Business in Cyberspace: Commercial Ventures on the Matrix; *Whole Earth Review*.

And for an offbeat treat, try **Kevin, University of Saskatchewan, Canada**, for a virtual tour of Kevin's Prairie Dog Town. (On May 1, this option is transferring from Gopher to World-Wide Web.) ■

Shawn Downing is a computer support specialist at CTY. Let him know about other intriguing files you locate on your trip through the Net. You can reach Shawn by e-mail: gifted@jhunix.hcf.jhu.edu

Computer Science

Combining Verbal and Mathematical Skills

by Brian Milch

One advantage of taking the SAT's early is that it can help you gain a clearer idea of what you're good at, based on the difference between your verbal and mathematical scores. However, if your two scores are similar—as mine were—you face a dilemma. You'll want to choose a course of study and, later, a career that will take full advantage of both your verbal and mathematical aptitudes.

Computer science, along with the applied field of computer programming, is one of the fastest growing careers in the world today. Although many people think of it as being just for math whizzes, I've found computer science to be a field in which both my verbal and mathematical skills are exercised to their utmost extent. In fact, those with a balance of verbal and mathematical aptitudes will probably do best in this field.

It's about Math . . .

Many aspects of computer science appeal to my mathematical side. Certainly, there are valid reasons why programming languages like BASIC and Pascal are taught by the mathematics department at my high school, instead of by the foreign language department.

To begin with, programming is rigorous and logical. Most problems in computer programming have one optimum solution, and that solution can be reached by educated reasoning. Precision and organization are just as crucial to successful computer programming as they are to solving mathematical problems.

Then, too, computer science is necessarily a quantitative discipline. Computers can only deal with numbers, so everything in computer science must be reduced to numerical form.

Another aspect of computer science that appeals to my scientific impulses is the feeling that I'm solving a problem and that my solution can be evaluated objectively. Computer scientists actually create systems and programs that can be evaluated according to quantified standards of speed, efficiency, and reliability.

And about Language

There are times, though, when I think computer programming should be transferred to the foreign language department. This idea first came to me when I noted that the ratio of text to explanatory notes in my Latin edition of the *Aeneid* is about the same as that in a book of sample computer programs. The fact that computer scientists always use programming *languages* indicates the extent to which verbal intelligence is useful in dealing with computers.

Programming languages, just like human languages, are sets of symbols used for communication. Each individual programming language has its own grammar and syntax, as well as a vocabulary consisting of the names of functions in a standard library. Computer scientists have even gone so far as to publish style manuals for writing programs, and they speak of making idiomatic translations between programming languages.

The verbal side of me also loves the fine shades of meaning that separate words used in computer science. Often, understanding how a program works requires the same mental processes as doing analogy questions on the SAT.

Finally, computer science is attractive because it is based on symbols, not physical objects. If you have trouble visualizing what a drawing would look like reflected in a mirror, or tracing the movements of gears in a schematic diagram, this difficulty probably won't trouble you too much in computer science.

The Best of Both Worlds

I've derived a lot of enjoyment from computer science as a hobby, and I'm seriously considering it as a career. It's an excellent way to combine the rigor, precision, and objectivity of mathematics with the mastery of grammar, syntax, and vocabulary on which language arts are based. For me, a well-written computer program combines the beauties of an elegantly solved mathematical problem *and* a finely worded essay.

Brian Milch *(bcmilch@aol.com) has benefitted both educationally and monetarily from writing shareware computer programs. A junior at Sutherland High School in Pittsford, New York, he is taking AP courses in history, science, and a foreign language. Brian has won a number of awards as a Model United Nations delegate and also swims competitively.*

The Abstract (and Sometimes Concrete) Profits of Shareware

Anyone who gets involved in computer programming as a hobby will soon discover the wonders of shareware. The shareware system, which has developed gradually in the on-line community, is an ingeniously simple method for the distribution of software. I've been both a consumer and a producer of shareware.

Writing a program does not require any formal training; I just taught myself using a few books. The only required materials are a computer and a "programming program," a piece of software that allows you to write your own programs. The distinguishing feature of shareware is that the programmer includes a message such as, "If you enjoy using this program, please send a check for $US 10.00 to the following address . . ." Then, the programmer transfers copies of the program to electronic bulletin boards, on-line services, and the Internet.

The assumption is that people will make copies of the program, use it, distribute more copies to other on-line services, and possibly even send the programmer a check. My own experience indicates that 5%-15% of those who use a given shareware program actually pay for it.

The shareware system has a lot of advantages over traditional distribution methods. No one has to worry about illegal copying of programs (software piracy), because the programs are intended to be copied freely. Users can try out a variety of software before actually paying for any of it. And programmers benefit because they are able to earn some money for their exertions without the hassles of distribution.

Of course, there are some drawbacks. Many shareware programmers fail to provide proper technical support for their creations, and many shareware users simply don't pay for any programs.

Nevertheless, for an amateur programmer who wants some extra cash to support his or her computer habit, shareware definitely is the way to go. ■

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How one fledgling programmer struggled with other computer languages before discovearing the joys of Scheme . . .

HIGH SCHOOL COMPUTING *The Inside Story*

by Natasha M. Chen

My first class in computer programming was an elective course in BASIC back in sixth grade. I chose that class because I thought that computers were powerful and capable of doing many interesting things. Electives usually have a reputation for being fun, but my classmates and I heard stories about the difficulty of this course and how only one or two kids ever got As. I thought to myself, "Maybe they just weren't interested in computers. But I am, so how bad could it really be?"

Pretty bad! Forget learning anything that encouraged us to think, wonder, and explore. We were asked to study the history of computers, memorize the names of hardware, and master the rules of syntax. We were sixth graders. We weren't about to enter the high-tech world of programming. All we wanted was to see what neat things we could do with the computer. The class wasn't difficult at all; memorization is hardly a challenge if you take the time to do it. There were so few As because no one cared to do busy work, and that's all that was offered.

After my sixth grade BASIC experience, I never wanted to take another computer course again. Of course, when you are 11 years old, GPA and class rank don't mean much to you, but by the time I was about to enter my junior year in high school, I started thinking about those things . . . and college . . . and the classes I needed to take. To avoid another BASIC nightmare, I decided to bypass Computer Programming I (BASIC) and go straight into Computer Programming II (Pascal). Pascal was different enough from BASIC to make me think that it had to be better. I found out that the improvement was far less than I had hoped. We jumped right into the syntax of Pascal: program (input, output), begin-end, etc. Even after two years of studying Pascal, I still can't remember all the rules.

It's like trying to interest small children in reading. You try to show how much there is to discover in books by reading with or to them. Maybe they will pick up some books on their own, and then some more, and pretty soon they will have built up a library. But if you dump the library on top of them, ask them to memorize the Dewey Decimal System and then put the books back in order, by the time they finish—assuming they do—they won't care to look at another book, much less read one.

One of the students from that CP2 class had a very hard time with the syntax of writing information-processing programs, but when it came to the one graphics program we were assigned, he was an absolute genius. I can't begin to describe all the amazing things he could make the cursor do. But he was never recommended for the Advanced Placement class. By having no place for such a student, the computer education system may very well be tossing aside some of the best computing minds, simply because they don't fit the mold of the curriculum whose rigidity derives from that of the languages used.

Five of us made it to the AP class, and four more came from the CP3 (FORTRAN) class. We spent the first two days refreshing our memories of the syntactic rules that had evaporated over the summer. It seemed as if the purpose of CP2 was to teach us the rules, and now we had to remember them so we could play the game—someone else's game.

The last year was one of frustration. The most commonly heard outburst in our classroom was undoubtedly, "Stupid computer!" No matter what, it was always the computer's fault. It seemed that my classmates' programming strategy was to let the computer find their errors in the hope that this would somehow help them solve the problem. It never occured to them that the computer is simply a testing ground for a well-thought-out idea. A human could conceivably go through an algorithm manually; it would just take an intolerably long time. For most of my classmates, this was their fourth year in the computer education system, and all it had taught them was to rely too much on the computer and not enough on themselves.

The root of this problem lies in what is currently thought to be important for students to learn in programming courses, namely, syntax. Whoever is designing the high school computer science curriculum seems to think that, once students learn the rules of the language they are studying, having them write programs that demonstrate how those rules are applied will teach them what is important in computer science. As a student who has been through the system, who has had to waste the majority of my patience, concentration, and effort on keeping the syntax of my programs straight, leaving barely enough of these qualities to devote to solving the problem, I can tell you that such a belief could not be more wrong. This method of teaching is brainwashing. It is a danger to computer science, sending out trained hackers instead of enthusiastic visionaries. Fortunately for me, I was given the opportunity to recover.

In ninth grade, my math class began an introductory course in Logo. My classmates and I looked forward to every other Friday when we studied Logo, not only because it meant a break from math, but also because working in Logo was a lot of fun, and it was easy. Unfortunately, that course was "squeezed out" by the pressure of our math courses over the next three years. During that time, however, the course had been rewritten using Scheme.

As a senior, I had a study hall period that I sometimes spent in my math classroom doing homework. It was on one of these days that I happened to overhear my math teachers talking about Scheme. I was already tearing my hair out in my Pascal class trying to learn something for the upcoming AP exam—in fact, all I was learning was the page number of the reference section in our textbook, which I frequently consulted to see whether type declarations or variable declarations came first or to re-check how to declare a record for a linked list. Enticed by what I heard, I gave up my

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81

High School Computing

continued from page 15

study hall to come in four days a week to learn Scheme on my own, using *The Schemer's Guide*. My reward was that I regained the enthusiasm and interest I had lost six years earlier.

In the four months it took me to complete my course in Scheme, I learned more about computer programming that I had in my two years of Pascal. In less than five minutes after I began reading the text, almost everything I learned more than three years previously in our aborted Logo course came back to me. Five minutes—not the two days it took to recover from a summer away from Pascal. There were hardly any rules of syntax to remember. Furthermore, throughout the entire four months, I never touched a computer. The ease of learning and using Scheme gave me such confidence in the programs I wrote that I didn't feel the need for the security of a compiler to check my work.

The thing I liked most about taking this course was that I knew that I was learning something. Every concept I had ever tried and failed to understand comprehensively in my Pascal class—searching and sorting procedures, recursion, processing binary trees—was made clear when I studied them in Scheme. These things occur so naturally in Scheme that I couldn't help but understand. After mastering the concept, I could then go back into my Pascal class and master the code. The point here is that concepts like these are universal in computer science. After you understand them, then you can learn the rules of any language in order to encode them. But it doesn't matter how well you have mastered the syntax of a language if you don't understand the meaning of what you are typing or the reason why it works.

Recursion is a prime example. My understanding was very vague; I knew that something was done over and over again. But after seeing the first recursive program in the Scheme text, I understood what it was all about. When we took the test on recursion in AP, my whole class seemed to choke, with grades in the 60s and 70s, and the second highest score in the 80s. Thanks to my background in Scheme, I aced the test. I couldn't quite believe it myself. I realized that Scheme was not only easy to learn; it was also easy to learn from.

It is a myth to think that length and complexity make a program impressive—a prevalent idea among my AP classmates. Scheme code is clear and easy to understand. There is no need for pseudocode. Thoughts go straight from your head to clear, simple code. The strange thing is that Pascal sets you up to fall into the trap of complexity and to disobey the laws of top-down design. As a procedural language, it enticed us into trying to do too much in one procedure simply because it could be done. With Scheme, I couldn't write a function that had more than one purpose. It is as inherently top-down as it is inherently recursive.

I don't know whether the Advanced Placement exam is designed to fit the curriculum or if the curriculum is designed to fit the test, but I do know that I went through both. And if that's all we are expected to know after four years of study—what happens after so many iterations of a sort, or how to count the number of nodes on a binary tree—then those responsible for education in this field, the field of the future, can never hope to attract more than a few students, and mediocre ones at that.

Scheme can change that. In four months, I not only covered and understood everything that had been presented in the Advanced Placement course, but went beyond that to study functional programming, data and functional abstraction, objected-oriented programming, and artificial intelligence. I still can't believe all the amazing things I have learned in this short time. This is how I wanted to learn when I was in that BASIC class in sixth grade. I had to wait six years, but it was well worth it. Scheme is moving toward the future in computer science education, a future that high school graduates, even of the AP course, will not be prepared for if the curriculum continues to use BASIC and Pascal.

I wrote this article because I don't want another kid to go through the frustration I did and not get anything out of it. I don't want another kid's enthusiasm snuffed out by a pile of library books. I want students who study computer science to be inspired to create their own game. Kids never liked rules anyway, and that's all we are—kids! ■

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Natasha Chen *received the Senior Class Most Improved Computer Science Student Award when she graduated as class salutatorian in 1991. She is now a college senior studying mathematics at the University of Southern California and plans to pursue a career in finance.*

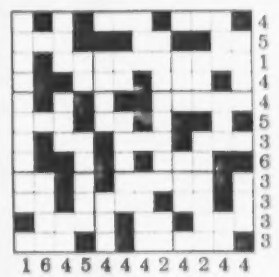
A dialect of LISP, the standard language of artificial intelligence research, **Scheme** is being used to improve computer science education at the secondary and undergraduate levels. Scheme has been taught in MIT's introductory computer science course since 1980 and will be used in CTY's "Theoretical Foundations of Computer Science" for the fourth year this summer.

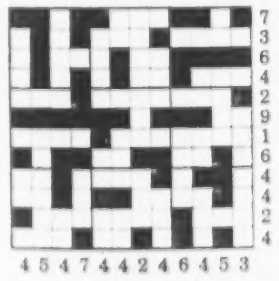
Two types of Scheme self-teaching tools are suitable for both novice and experienced programmers:

- **The SCHEMER'S Guide** textbook (Second Edition, 1995, $35.95), written by Iain Ferguson with Edward Martin and Burt Kaufman, introduces the Scheme programming language and guides readers through such concepts as functional programming, recursion, data structures, higher order functions, delayed evaluation, and object-oriented programming.
- **EdScheme**—self-contained, interactive software—provides a Scheme interpreter with such features as a built-in language-sensitive editor, turtle graphics interface, extensive debugging facilities, and comprehensive, fully-indexed User's Reference Manual. (Available in three versions: DOS $49.95, Macintosh $59.95, Windows $129.95.)

Schemers Inc., 2136 NE 68th Street, Suite 401, Fort Lauderdale, FL 33308; (305) 776-7376; fax (305) 776-6174; e-mail 71020.1774@compuserve.com

Solution to Puzzle in January/ February issue of *Imagine*:





BOOK REVIEW *continued from page 24*

has not yet been reproduced algorithmically because the set of instructions is extremely long and complicated, involving a tremendous number of variables; but—according to them—with enough work, we could build a computer program (albeit a long one) that behaves just like a human brain.

At first sight, it might seem logical to accept the claim of AI proponents. However, Penrose—employing exclusively mathematical and scientific considerations—manages to suggest that their theory is misguided. He begins by recapitulating some of the discussion within the AI community as to what constitutes artificial intelligence. In 1950, the British mathematician Alan Turing predicted that computers would become intelligent enough to pass for human beings in conversation. In what is known as a "Turing test," a human being converses via a keyboard with an unidentified partner and tries to tell whether the partner in conversation is a human or a computer. (Human partners in Turing tests are instructed to act as "human" as possible). If a computer program could repeatedly fool the examiner into believing it is human, then, according to Turing, it would constitute an artificial intelligence.

Consider, for example, a computer program designed to simulate a clinical psychologist. A human being, playing a patient, types in statements such as, "I feel depressed today." The program then produces a statement such as, "Why do you feel depressed?" The program recognizes patterns in the patient's input and uses them to select appropriate responses. If the program does not find a recognizable pattern in the input, it can ask for more information with prepared phrases such as, "Tell me more about it." From the patient's perspective, it may be difficult to tell whether the partner is a real psychologist or a computer. Strong AI proponents claim that such algorithms constitute valid approximations of mental processes and will eventually be sophisticated enough to match the work of a real psychologist and pass a Turing test.

Penrose then summarizes UC-Berkeley professor John Searle's famous "Chinese room" argument. Searle noted that, while he does not know a word of Chinese, he could be locked in a room, fed input in Chinese, and by following algorithms like those used by the computer psychologist, produce responses that would make it seem as if he were understanding statements in the input. He might be able to fool his partner in conversation into believing that he spoke Chinese. Yet, he would not have understood anything of what he had received—or replied to—in Chinese.

Searle thus suggests that, although algorithms may allow a computer to reproduce human *behavior*, they cannot account for the *comprehension* a human brain has of what it reads, hears, or says. He believes that, while a computer could conceivably pass a Turing test, it would not be truly intelligent. Orthodox AI proponents, on the other hand, believe that behaving like a human is all that is needed to be considered intelligent, and that the 'comprehension' question is meaningless.

Penrose takes his argument a step further, claiming that humans can do things that no algorithm, no matter how complex, can imitate. He describes several mathematically demonstrable cases where a human can come up with answers to problems that no computer could tackle. He explores the implications of Gödel's theorem, which proved that in any sound logical system with a finite number of postulates, there will be statements that a human can know to be true, yet which are not provable in an algorithmic, formal way. He shows us "tiling problems" that a human being can quickly solve, yet for which it is proven that the solution cannot be reached with any algorithm.

The author suggests the existence of a "quantum computer" much more powerful than any algorithmic computer, and finishes by proposing that our brain might in fact *be* a quantum computer, obtaining its powers from properties of quantum mechanics that have not yet been fully understood by physics. (For those intrigued by this speculation, Penrose published an equally outstanding book entitled *Shadows of the Mind*, which takes his arguments several steps further, by means of recent discoveries in the field of neurobiology.)

The Emperor's New Mind is definitely a book worth reading and rereading, a book that will perdure for years to come, even as science advances at its quick pace. The author may eventually be proven wrong (which does not seem likely, for his arguments are all convincing), but his clear treatment of AI, advanced physics, and mathematics ensures that the book will hold our interest. *The Emperor's New Mind* is both accessible and profound, a combination very rarely found in science books, and one of which the reader should take advantage. ■

***Alejandro Jenkins** lives in Costa Rica, where he attends the national math-science magnet high school. Earlier this year, he was awarded First Prize in the National Science Fair for his project "Relationship Between Climatic Factors and Seismic Activity in Costa Rica."*

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1. Two quadratic equations

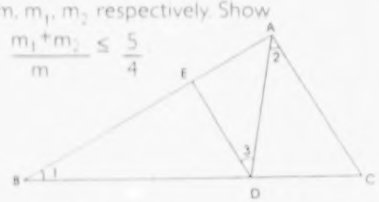
$(a-1)x^2-(a^2+2)x+(a^2+2a)=0$ (1)

and $(b-1)x^2-(b^2+2b)=0$ (2)

have a common root, where a and b are two distinct positive integers greater than 1.

Find the value of $\frac{a^b+b^a}{a^{-b}+b^{-a}}$

2. In the figure below, point D is on $\overline{BC}$ and E is on $\overline{AB}$, $\angle 1=\angle 2=\angle 3$, and the perimeters of Δ ABC, ΔEBD, and ΔADC are m, m_1, m_2 respectively. Show that $\frac{m_1+m_2}{m} \leq \frac{5}{4}$



3. In the figure below, triangle ABC is inscribed in a circle with radius R=4, $\angle A=60°$, and $|AC|-|AB|=4$

Find the area of triangle ABC.

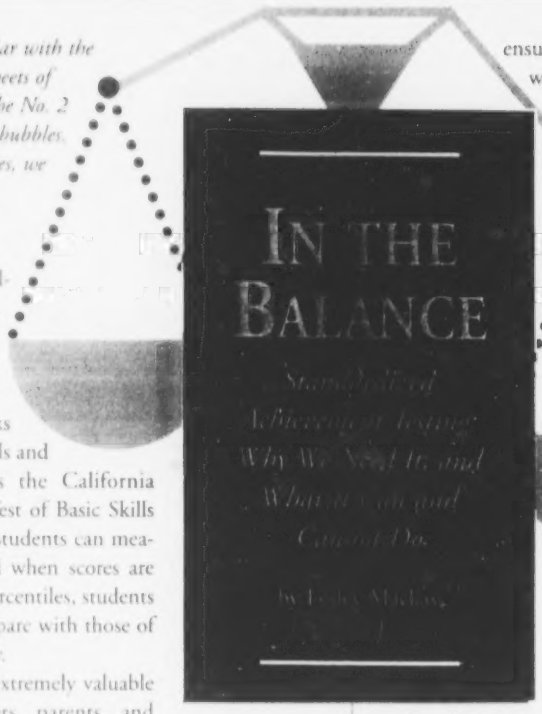
4. Given that p,q, $\frac{2p-1}{q}$, and $\frac{2q-1}{p}$ are four integers, and $p>1$, $q>1$, find $p+q$.

5. A, B, C, D, E, and F are the six intersection points of two congruent equilateral triangles PQR and P' Q' R', AB=a, BC=b, CD=c, DE=d, EF=e, and FA=f. Show that $a^2+c^2+e^2=b^2+d^2+f^2$

Problem solutions will appear in our May/June issue.

Mr. Feng teaches mathematics and coaches math teams at the Oklahoma School of Science and Mathematics. He offers *Imagine* readers questions designed to improve their problem-solving skills.

Today's students are almost as familiar with the columns of bubbles on the answer sheets of standardized tests as they are with the No. 2 pencils they must use to fill in those bubbles. In this article, the fourth in our series, we assess the debate over standardized achievement tests.



One key value of standardized achievement tests, which measure how well students have learned the material covered in school, is that they establish universal benchmarks for the assessment of academic skills and understandings. Exams such as the California Achievement Test and the Iowa Test of Basic Skills provide a standard against which students can measure their own proficiencies. And when scores are ranked according to a system of percentiles, students can also see how their results compare with those of other test-takers across the country.

Achievement testing provides extremely valuable information to students, teachers, parents, and school districts. Nevertheless, widespread opposition has at times dominated discussion of achievement testing, as well as of other types of standardized examination. Critics hold that the practice of standardized achievement testing is misguided and has undermined learning and accomplishment in our schools and classrooms.

The following discussion looks at the often vehement debate over this form of testing. In the balance, we believe that the negative judgments leveled against achievement exams more often reflect the imperfect implementation of testing in our schools than expose fundamental flaws in the tests themselves. While criticisms of testing provide useful guidance for formulating and implementing strategies for improvement, none cancels out the value of standardized assessment.

Standardized achievement tests bring benefits to many different dimensions of the educational world—to school systems, individual schools, individual educators, and most importantly, to individual students—when test scores provide vital feedback in assessment efforts.

Tests as Tools for School Systems

Providing a means by which educational efforts can be meaningfully evaluated, achievement tests are essential to the functioning of today's schools and school districts. Tests promote accountability within the educational system, furnishing scores that can be used as benchmarks to help us gauge whether acceptable academic standards are being met within individual schools.

The importance of achievement test scores is related not only to students' desires to make progress in their learning, but also to the general desire to *improve* American education. A widespread belief in the necessity of reform has pervaded thinking about schools and students for decades; almost everyone believes that education needs to be strengthened and refined.

Responses to the call for educational improvement are myriad. But in a large country with a diverse populace and widely differing school environments, how can accountability for programs and improvements be ensured? How can educators and the public know whether the steps being taken to strengthen schools are indeed contributing to the academic achievements of students?

One way to measure the value of new, as well as long-standing, educational efforts is through standardized testing. If an innovative program for teaching mathematics is implemented at a particular school, for example, students' subsequent test scores can be compared with those achieved when the former approach was in place. (Of course, the test must be capable of reflecting progress made due to the innovation.) The two sets of results ideally provide a means for weighing the effectiveness of both methods.

Hazards of Students' Exaggerated Concern with School Test Performance

Because test scores are viewed as indicators of the merits of educational programs, as well as of the competencies of individual students, a "high stakes" environment often surrounds achievement testing. Critics note that undue anxiety over test results can be harmful to students, and it is true that schools must guard against promoting excessive concern over standardized achievement test scores. Students do not benefit when the importance of scores is exaggerated; many other meaningful methods exist for identifying and charting learning progress.

Hazards of Teachers' Exaggerated Concern with School Test Performance

But the debate over achievement testing is not limited to testing's effects on *students*. Some critics have argued that achievement tests hamper *teachers* by restricting their ability to approach their subjects in rich and inventive ways. According to this view, teachers who feel pressured to "teach to the test" may sometimes feel compelled to modify their lesson plans and other aspects of instruction in order to prepare students for specific standardized exams.

Even without determining how much teaching to the test actually takes place, we can consider what the merits and pitfalls of this practice might be. On the one hand, it can be argued that when teaching focuses exclusively on the material to be covered on standardized tests and on how to take those tests, learning is impoverished. The need to prepare students for testing may sometimes detract from teachers' capacity to introduce different materials and approaches and, in some cases, to meet students' genuine learning needs.

On the other hand, well chosen, well designed tests can be aligned with challenging curricula without detriment to student learning. Even rote activities, such as drills focusing on grammar or mathematical knowledge, can greatly contribute to students' academic comprehension and confidence. Drilling in advance of tests may seem to some like an unimaginative use of students' time, but drilling may be precisely what many students need, irrespective of upcoming standardized exams.

As with so many other questions pertaining to education, it is important not to fall into an either/or perspective about achievement testing. It

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is not that educators must choose between exploring *Romeo and Juliet* or preparing students for a test by reviewing the uses of the subjunctive mood. Rather, it is that *Romeo and Juliet* can provide an excellent forum for exploring the subjunctive mood—as well as many other topics, of course. In fact, standardized test preparation need not conflict with other valuable teaching strategies and goals.

Tests as Tools for Educators and Students

The greatest value of standardized achievement testing is found in the benefits it can bring to individual students across the entire achievement spectrum. By identifying the skills and understandings that students must master next in their learning, test results can play a critical role in the selection of appropriate educational experiences for everyone.

Of course, this requires a responsive learning environment in which students are allowed and encouraged to progress according to their academic abilities. *Flexible grouping* according to ability, *flexible instruction*, and *flexible pacing* are critical counterparts to the effective use of standardized achievement tests.

Achievement Tests and High Scorers

For tests to serve as a worthwhile educational tool, students must be tested at an appropriate level of challenge. This consideration raises difficult questions concerning academically outstanding test-takers, who may regularly "top out" on in-grade achievement tests. Since these tests are specifically designed to produce a bell-shaped curve of score outcomes, it's more than likely that some test-takers will indeed hit the test's ceiling.

For such students, out-of-grade exams with higher ceilings may be used diagnostically to identify their actual range of ability and true learning needs. When students demonstrate skills and understandings far beyond those typical for their grade level, options for more advanced instruction should be considered. At the same time, schools and teachers may want to exempt such students from in-grade tests or, at the least, from classroom instruction that is geared towards preparing for these tests.

Achievement Tests and "Low Scorers"

Some critics of standardized achievement testing argue that testing can potentially harm "low scorers." According to this view, a large sub-section of students may move through school with ever-lengthening records of disappointing results and percentile rankings that suggest academic inadequacy. Those who oppose testing sometimes hold that such students' self-esteem will suffer from analysis of their skills, and hence they should not be informed of areas where improvement is possible.

Supporters of wisely implemented testing counter that all students can improve and are most likely to do so following identification of their academic strengths and weaknesses. *In order for standardized achievement testing to be used effectively for* ***any*** *test-taker, scores should serve primarily as an impetus for action.* Instead of being used to label "low scorers," test scores should assist in identifying the learning and remediation individual students need in order to master new skills and understandings.

To be more specific, a student who does poorly on a major standardized test should be provided with skills' reinforcement supplemented by additional, more narrowly focused, testing. Such ongoing diagnostic assessment allows both students and educators to know when particular learning goals have been met, so appropriate advancement can take place.

Acknowledging Testing's Limits

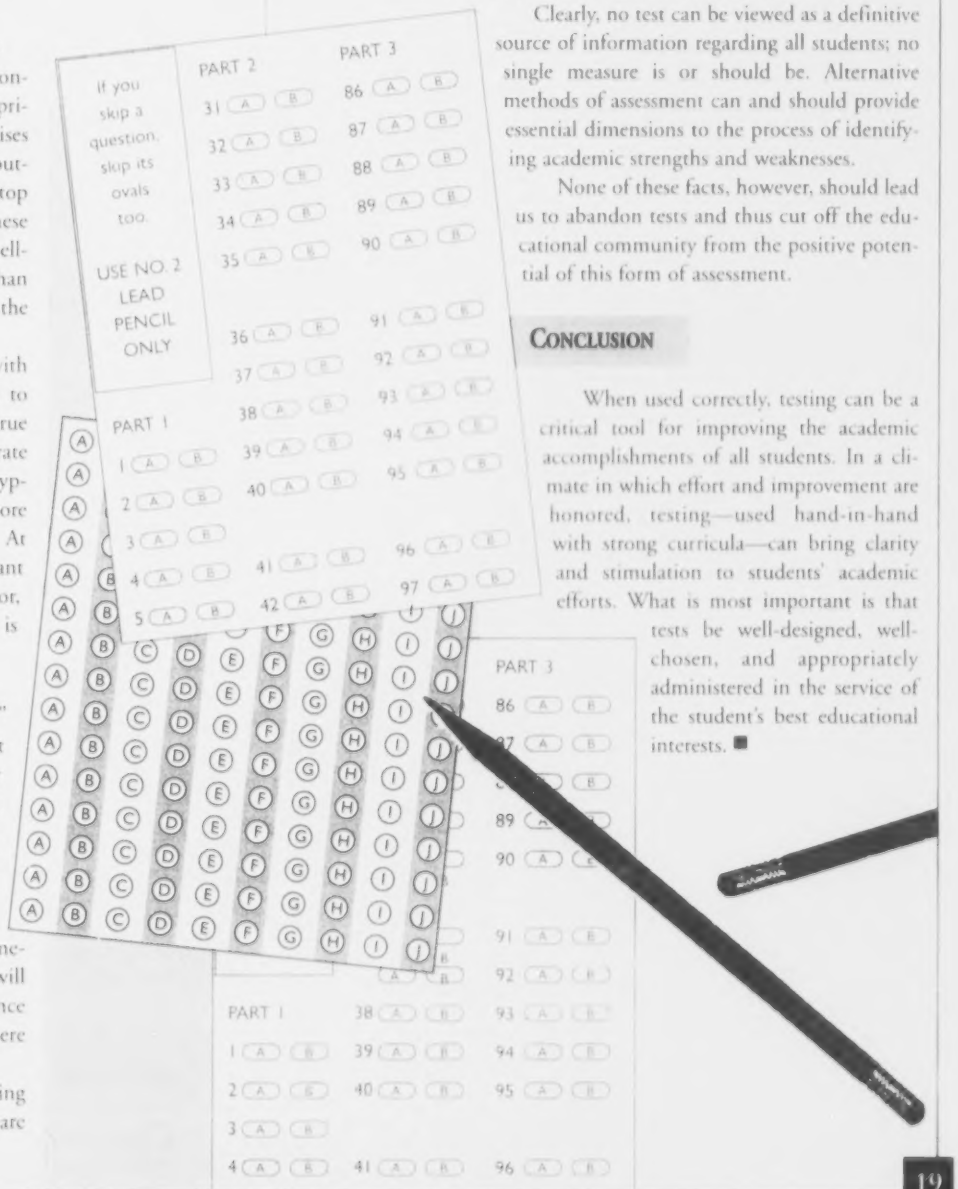
It is also critical to recognize and appreciate the *limits* of standardized achievement tests. Some of the testing instruments currently used are in need of improvement or even replacement. And tests clearly have been misused. These important tools can be over-valued, to the detriment of all with a stake in education.

Clearly, no test can be viewed as a definitive source of information regarding all students; no single measure is or should be. Alternative methods of assessment can and should provide essential dimensions to the process of identifying academic strengths and weaknesses.

None of these facts, however, should lead us to abandon tests and thus cut off the educational community from the positive potential of this form of assessment.

Conclusion

When used correctly, testing can be a critical tool for improving the academic accomplishments of all students. In a climate in which effort and improvement are honored, testing—used hand-in-hand with strong curricula—can bring clarity and stimulation to students' academic efforts. What is most important is that tests be well-designed, well-chosen, and appropriately administered in the service of the student's best educational interests. ■



FASCINATING CLASSICS

THE GREAT GATSBY

by F. Scott Fitzgerald

Review by
Charles Beckman & Lesley Mackay

Charles: One good thing about classic novels is that they endure and can wait for their readers to grow up. I first encountered *The Great Gatsby* in college: I read it, went to class, and discussed it. But ten years later, what I remembered best were stories about the wild life of its author—such as the one my professor told about F. Scott Fitzgerald's driving into town with his wife, Zelda, perched like a hood ornament on the front of their car.

But this time around: Wow, what a great book!

Lesley: The characterizations and the powerful themes give this novel its staying power. But, for me, Fitzgerald's writing makes the novel great.

"In his blue gardens men and girls came and went like moths among the whisperings and the champagne and the stars." Sentences like this—nowhere to be found in Dickens or Brontë—are at the heart of this novel's celebration of the senses. Whether Fitzgerald is describing Gatsby's garden parties, his rich stock of silk shirts, or Daisy's musical voice, he evokes an almost painful sense of beauty and of the desire that beauty provokes.

The kind of beauty that haunts *The Great Gatsby* is not natural, but the more complicated loveliness that contains an element of illusion, of human manipulation. This beauty comes to life in the fantasies of the beholder, as Daisy's charms live in the consciousness of Jay Gatsby.

In Gatsby's world, beautiful illusions have a power that can be devastating. Fitzgerald writes about impressionable people under the spell of their desires. His characters drink too much, give in to their passions, and spend extravagant sums of money. Sometimes, their lives—like the cars they drive—spin out of control.

Charles: The writing does stand out, especially in contrast to the relative ordinariness of the plot: a wealthy guy yearning for a married woman he once loved, some parties, some rich people, some poor people, a car accident, a murder. The landscape is also ordinary—Long Island Sound, an unpoetic body of water that Fitzgerald describes as a "wet barnyard."

I thought the narrator, Nick Carroway, was similarly unremarkable. Coming from the Midwest, Nick sets his sights on New York and a bond trading career. He's a decent guy along for the ride, who happens to move in next to Jay Gatsby's mansion. In this way, Nick becomes the lens through which we see Gatsby.

But—as you point out, Lesley—when the plot stops and the description begins, what a view! It's Gatsby this and Gatsby that, coming and going in his grand yellow car, reposing in a pink suit on a long manicured lawn, throwing parties teeming with beautiful people. In fact, I have a confession: Gatsby's over-the-top, Roaring Twenties' parties, although clearly serving no socially beneficial purpose, do sound like a lot of fun.

Lesley: I agree with you about the parties. But not that Nick is an unremarkable character. In fact, I think that Fitzgerald's unassuming Nick is an extraordinary person. As narrator, Nick contributes the brilliant observations and insights that pervade this story. But beyond that, Nick provides a model for awareness and responsibility in Fitzgerald's world.

It is through Nick that the author makes subtle judgments of his cast of characters and their actions. Nick is a finely balanced storyteller who sympathizes with Gatsby, yet chooses for himself a much more sober path. The turning point of this book comes with the death of Myrtle Wilson and the ensuing coverup of responsibility. As he provides his perspective, Nick leaves little doubt that he is disgusted by the view of his friends that Myrtle's death provides. Of course, despite his disapproval, Nick continues to feel loyalty for Gatsby. Still, I think Nick's superior perceptiveness is a strong virtue within this novel's fragile system of values.

Charles: Lesley, you've answered my question as to why Fitzgerald chose Nick as the narrator. Carroway's understated judgments do provide the moral framework on which the novel rests.

Nick's complex sensibility is demonstrated late in the novel when a Gatsby business associate accidentally calls Nick. Before realizing his mistake, the caller chats breezily about a lower stooge in the empire who's been caught in some shady business. There is an inviting parellel here between the stooge, as a minor patsy in Gatsby's *business* life, and Nick, as a minor patsy in Gatsby's *personal* life.

Nick comes to understand this when, at the end of the novel, he's trying to round up some people for a decent showing at Gatsby's funeral: "It grew upon me I was responsible [for Gatsby] because no one else was interested—interested, I mean, with that intense personal interest to which everyone has some vague right at the end."

Nick realizes both that he's more deeply involved than he thought and that he's been duped. He grasps the extent of Gatsby's shallow relationships with people when no one comes to the funeral. Before, he might have thought that everyone loved Gatsby, but now he realizes that everyone feigned love for him, as a pretense to make a fortune or to have a party to go to on Saturday night. It's certainly deflating to discover that a person you admired turns out to be an unloved schnook.

Lesley: This confusion seems central to the novel. How do we know what is good and bad—and even what is real—in the modern world? Jordan Baker is young and alluring, but perhaps she is a cheat and a liar. The World Series might seem like a sportsmanlike contest of athletic talent, but perhaps the outcome has been fixed. Gatsby's library is chock-full of literary tomes, but perhaps no one will ever read them. Gatsby comes across as educated and distinguished, but perhaps his entire past is a lie.

These same questions have been raised in all the books we have considered in this series. Even in *Emma*, the heroine had to "get real" about her friends and acquaintances and about herself, as part of the process of growing up. But in *Emma*, there are downright good people. And in the more tumultuous *Jane Eyre*, well-bred people might have dark secrets but they hide them, as Mr. Rochester guards his former wife in his attic. We only have to consider the very different treatment of adultery in *The Great Gatsby* to realize the great moral distance between this novel and the one we last read.

Charles: Perhaps all this confusion partly explains why Fitzgerald puts so much energy into description. If you don't have a clear moral message, you might as well paint a brilliant picture. This time around, I especially enjoyed the wonderful portraits Fitzgerald creates. For me, only Walt Whitman, among other American writers, comes close in providing painterly descriptions of his subjects. Here's an example from a Gatsby party:

The large room was full of people. One of the girls in yellow was playing the piano and beside her stood a tall red haired young lady from a famous

chorus, engaged in song. She had drunk a quantity of champagne and during the course of the song she had decided ineptly that everything was very very sad—she was not only singing, she was weeping too. Whenever there was a pause in the song she filled it with gasping broken sobs and then took up the lyric again in a quavering soprano. The tears coursed down her cheeks—not freely, however, for when they came into contact with her heavily beaded eyelashes they assumed an inky color, and pursued the rest of their way in slow black rivulets. A humorous suggestion was made that she sing the notes on her face whereupon she threw up her hands, sank into a chair, and went off into a deep vinous sleep.

Lesley: This woman's attempt to reinvent herself has failed—for one night. Champagne and emotion have gotten the best of her; and the other partygoers, like Nick, regard her as ridiculous.

But really, she is just one step farther out on the diving board than the rest of her companions. Who doesn't make a fool of himself or herself during the course of this novel? Gatsby's parties offer a gorgeous setting in which madcap guests can dress up, enjoy themselves, and enact their most cherished dreams of who they wish to be.

Gatsby's money is the magical element that makes this fantastic free-for-all possible. And Gatsby, with his naive faith in the power of money as an agent of self-reinvention, epitomizes the author's interest in the puzzle of personal identity. Not only has Gatsby rewritten his own unglamorous history, he hopes that Daisy's viewing of the splendors of his mansion will blot out the reality of her adult life, as if that life had never happened.

We've seen the idea of self-invention before. Despite their obvious differences, Gatsby can be compared to Pip in *Great Expectations*. Both heroes are driven to "succeed," both undergo quests for inaccessible women, and both fall prey to the seductions of status and money. Both are ultimately chastened by life, their great expectations subdued by experience—and in Gatsby's case, a bitter end.

The significant difference between these two novels can partially be understood in terms of the social worlds they depict. In Dickens' mid-nineteenth century England, there is no place for a social climber like Pip. But in the twentieth century American landscape, social climbing—while risky—is a vast cultural enterprise. In Fitzgerald's climate of wholehearted capitalism, it is more legitimate to be on the way up. And there are many beautiful things to be enjoyed on the way.

Charles: Yes, beyond the characters and the language of this novel, the broader issues of American society are important here. Fitzgerald tells a great version of an, Industrial Age legend: a wealthy man who sells his soul to acquire a fortune. The legend resonates again a few decades later in Orson Welles' film, "Citizen Kane," in which Welles plays a deeply ambitious capitalist scion.

Both characters—and many others even in the modern popular media—struggle with the tension between the aggressive acquisition of wealth and the preservation of one's humanity and moral conscience.

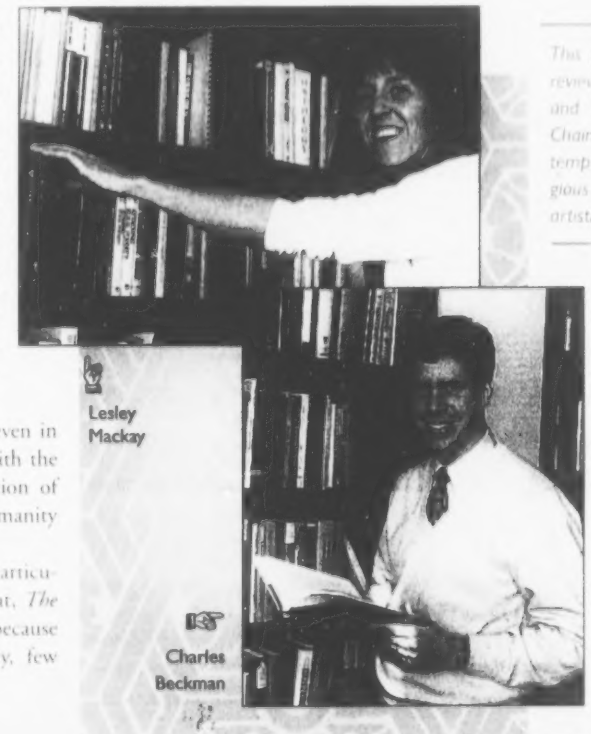
This tension isn't new; Adam Smith articulated it in 1776 in his capitalist blueprint, *The Wealth of Nations*, for example. And because this conflict pervades American society, few people today are surprised when a prominent junk bond dealer gets busted for dealing under the table. We almost expect it.

But I think it's a mistake to conclude that Fitzgerald was trying to say that the love of money is the root of all evil. There seem to be two sources of evil—or better, tragedy—in *The Great Gatsby*. One is the pitfall of obsession. The other is the act of substituting material pleasures for the needs of one's soul: in this case, Gatsby's acquisition of money to compensate for his unrequited love of Daisy Buchanan. In literature, such substitutions often bode ill.

Lesley: True. But it's also true that in modern literature it is often language that ultimately matters. Despite its exploration of human dilemmas, *The Great Gatsby* seems to exist more in the dimension of language than in that of morality. Fitzgerald's sentences have an elegiac quality. Their beauty is complicated by a melancholy that has to do with the fading of illusion and the passing of time. By blending sound, image, and significance, Fitzgerald explores the ties that bind beauty, memory, and the haunting presence of loss.

Charles: Yet, even though Fitzgerald describes the major characters—Gatsby, Tom and Daisy Buchanan, and Mr. and Mrs. Wilson—so strikingly that we could pick them out in a shopping mall crowd, we actually understand very little about them. Why did Daisy marry the portly, loutish Tom? What does Mrs. Wilson see in Tom? And most important, why does Gatsby go to such great lengths to be who he is—to change his name, reinvent his past, and live in a mansion across the water and in full view of a school sweetheart? Although the landscapes in the novel are reproduced with photographic clarity, the motivations of the heart are only suggested by charcoal lines. This contrast creates a strong sense of movement and energy.

I think we agree that this seeming contradiction—characters who are described so vividly, yet whose motivations are so mysterious—provides a tension in the novel that keeps the reader going forward. At the end, we feel that we've been through something. We take a deep breath, look outside, and wonder about the many people we think *we* know, and what we *really* know of their hearts. ■



Lesley Mackay

Charles Beckman

This year's Fascinating Classics series has included reviews of Emma, Great Expectations, Jane Eyre, *and* The Great Gatsby. *We will conclude with Chaim Potok's* My Name is Asher Lev. *This contemporary novel deals with the tension between religious and cultural identity and the quest for self and artistic expression.*

***Lesley Mackay**, who holds a B.A. from the College of William and Mary and an M.A. in English from Indiana University, is CTY's Staff Writer.*
***Charles Beckman** holds a B.A. from Penn State and an M.A. from the Writing Seminars at The Johns Hopkins University. He is an Assistant Director of Academic Programs at CTY.*

STUDENTS REVIEW

COLUMBIA

College Review Series

This on-going series is intended to aid prospective college students in their search by offering insiders' views of selected colleges and universities, as expressed by current undergraduates or recent graduates who have exceptionally high academic ability. Our reviewers all share high expectations for a college's academic standards and its nurturance of emerging talent.

Note that the number of student reviewers is small. Consider their personal perspectives as only one component while you gather factual information and impressions from such other sources as college catalogues, site visits, talks with officials and students on campus, and the advice of your guidance counselor and teachers.

Columbia College

Our reviewers include nine students, who major(ed) in American history (4), ancient studies (1), English (2), economics (1), geology (1), math (1), and psychology (1). Students' comments appear within quotation marks.

Quality of Academic Instruction for Undergraduates

Columbia has a core curriculum that emphasizes the "Great Books" that are the foundation of Western culture. (Note: Columbia has just expanded its core requirements; beginning this year, students must also choose a culture that is neither European nor American and take at least two courses that explore its history and tradition. Our reviewers' comments do not reflect this change.) Evaluations of the quality of instruction and the accessibility of professors were favorable, and several reviewers praised the spirited discussions that are an integral part of the Core classes. Several reviewers also noted that the many resources of New York City augment the excellent resources of the university.

"The Core is what distinguishes Columbia's curriculum from all the rest. It offers an excellent forum both to examine the foundations of Western culture (particularly the U.S. legal and economic systems and Western theories of psychology and morality) and to consider current issues (primarily political). Columbia's ethnic diversity is one of its greatest strengths, and Core courses often give rise to lively and provocative discussions of race relations, historiography, foreign policy, etc."

"The quality of instruction is ***excellent.*** *The professors are, for the most part, not only extremely knowledgeable but also dynamic lecturers. Columbia has some world-class faculty, particularly in History, Political Science, and English."*

"The library system is excellent, with nearly every department holding substantial collections. And between Columbia and the NY Public Library, I was never frustrated for information. However, if Columbia teaches you anything, it's self-reliance: the faculty and the libraries are spectacular, but you have to take the initiative to get the best out of them."

"I found NYC to be a great academic resource. It is an especially attractive place to study Art History. There were many occasions when I studied a piece in a class and was then able to go to a museum and look at it myself. Also, because NYC is the hub of so many different fields, almost everyone I knew was able to hold an internship related directly to their academic interests."

"Math/science/engineering courses are tough but good. High-level research facilities are available for motivated students in most fields."

"Class sizes are good, especially for a school this size; Core classes all have 25 or fewer students. Core instructors vary from the exceptional to the serviceable, but the personality of each class depends as much on the students as the instructor—the experiences both students and instructor bring to the class shape its character."

"The Core continues to be surrounded by controversy. It provides an excellent base; but the reading load is heavy, and discussions rarely go beyond a basic comprehension of the text. I read a lot in my Core courses but didn't do much to develop my analytical abilities. The coursework in my major (History), however, is much more challenging and enlightening. The History Department is truly one of the best."

"The Core is like most things at Columbia: it offers you a tremendous wealth of knowledge, but you only get out of it what you put into it. If you do all the readings (no mean feat) and participate in class discussions, you'll learn a lot. You don't have to kill yourself to get a decent grade, though, which is true of most of Columbia's non-science majors—there is definitely such a thing as a 'gentleman's B'."

Social Life

Reviewers remarked on the overwhelming influence that New York City has on Columbia's social life.

"Social life at Columbia College is unique with respect to other colleges. The urban environment defines the social life, with little emphasis on campus activities and few local bars. Most 'college stories' center around the city and its innumerable opportunities, rather than around a frat house, student union, or university bar. It can be overwhelming, and often lonely, at Columbia for anyone seeking to be part of a standard college community. But for a motivated, independent, and adventurous young person, NYC is an incredible place to be."

"The best way to come to NYC for the first time is as a Columbia undergraduate. You have all the resources of the city and thousands of people your age with whom to enjoy it. NYC can be a dirty, expensive, lonely (as well as exciting and inspiring) place, but as a Columbia student you're guaranteed a loosely-knit community and campus to serve as a refuge. (The campus is a little run-down but beautiful in a classic sort of way.) Unlike small schools in small towns, your choices at Columbia are endless."

"Security is good, and no dorm is more than a few minutes' walk from the campus. However, I would not suggest that anyone who is not enthusiastic about living in a big city choose Columbia; it's impossible to escape the city around you."

"I found that it was difficult to meet people on campus. The students at Columbia quickly adopt a mild version of the New York attitude: they are a bit wary of others and tend to make friends and then stick to a small group of people."

What Do You Like Best About Columbia?

Reviewers emphasized Columbia's diversity, the level of intellectual discourse, and the opportunities of NYC.

"The people. Columbia tends to draw ambitious, bright people who are happily free of Ivy League snobbery. The student body is quite diverse. You're bound to meet people who share your interests, as well as people who challenge you and force you to define yourself, and, of course, people who aren't like you at all. But they all have something to offer. I found that I learned something from almost everyone I met there."

"Students, regardless of their major, are required to study a certain basic foundation. This creates an intellectual point of reference for debate and discourse which, far from generating uniform thought, provides a common language in which a variety of issues and ideas can be discussed."

"NYC is a vast playground; it's such an enriching place to be a student. Living there really does form your personality—not a lot intimidates you after New York. Many places can give you a good education, but few give you the confidence and savvy that Columbia does."

"Being in NYC is an outstanding opportunity for those with a sense of adventure and enough ego to think they can run with the big dogs."

What Do You Like Least About Columbia?

"Although NYC is a great asset to Columbia, it is also its greatest drawback. There is not much school unity at Columbia because everyone spreads out into the city."

"The academic advising system here is pretty weak (all four years). It's easy to slip through the cracks and take courses you later regret having taken. You have to pin down professors for attention and advice, but it can be done. Try to latch onto a mentor of some sort early on."

"The polarized social and political factions. I objected not to their presence but to their tactics and refusal to accept others' positions."

"Some of the social fragmentation can be a pain at times. People at Columbia are smart enough that they can get along on a person-to-person level, even if groups of people often insult each other and try to tear each other down. Why can't we all get along?"

Who Would Be Most Compatible with the Academic and Social Atmosphere at Columbia?

While one reviewer asserted that "anyone can find a social niche," the others felt that only fairly assertive individuals will thrive among the challenges of the school and urban environment and take advantage of what Columbia has to offer.

"Someone curious and unafraid of cities, someone excited about drawing from a strong liberal arts education throughout their life after college; someone who wants to combine traditional collegiate life with a dose of real-world energy; someone who wants to learn from NYC's offerings—museums, performing arts, media, business. It is not a place for someone who wants the typical college experience. The overwhelming number of opportunities can be paralyzing."

Columbia College of Columbia University

New York, NY 10027
(212) 854-2522

- 4-year private coed college
- Urban campus in NYC's Upper West Side
- Full-time undergraduate enrollment 1994–95: 1,788 men; 1,673 women
- Special features: Columbia College is one of several undergraduate institutions of Columbia University; the School of Engineering & Applied Science and Barnard (a women's college) offer other undergraduate curricula and environments. In addition, several joint B.A./Master's programs are offered between Columbia College and the University's other schools (Schools of Arts, Law, Engineering, International & Public Affairs, and the Juilliard School of Music).

"Columbia is a school for people who are smart, outgoing, confident, and enjoy being around other people who are the same way. It's a school for people who can take advantage of being in the right place at the right time; the range of opportunities is wasted on someone who's waiting for instructions, rather than jumping out and making his/her own way. It's not a dog-eat-dog school, but it might be discouraging for someone with a fragile ego."

"I recommend Columbia most strongly to adventurous types. Columbia does not hold your hand, and NYC can be a difficult adjustment. But I think the city's 'tough love' teaches a valuable independence. And Columbia is home to some of the most vibrant minds and scholarly work around."

"An intense, independent personality willing to argue in class, argue in bars, argue in stores, argue with the registrar, argue on the street, and take advantage of the city; if you don't, the downsides of the city will win out."

If You Had It To Do Over Again, Would You Go To Columbia?

All but one reviewer gave an unqualified yes; one has some mixed feelings.

"Absolutely. There's no other school remotely like it on the East Coast, not even other NYC schools. Nothing combines collegiate, urban, and intellectual life the way Columbia does."

"In a second. I originally chose Columbia over Yale on the logic that, while both were great schools academically, I'd rather spend four years in New York than New Haven. It turned out to be one of the best decisions I ever made. Columbia is a great place to come into your own and to gain a perspective on life not available anywhere else. Columbia's book-learning is among the finest anywhere, and the experience of living in NYC—while not for everyone—is, for those who want it, unparalleled. While I'm sure I could be happy at a lot of schools, I feel that the opportunities available anywhere else couldn't possibly match up to what I've found here."

"Emphatically yes. Columbia—for all its intransigent and blinkered student groups, its '60's generation faculty criticizing students for their failure to rise up in social revolt, and its location in a neighborhood comparable to a demilitarized zone—provides its students with an unparalleled opportunity to grow intellectually and socially."

*"I might consider a smaller school or one not in NYC for a more traditional campus social life. NYC can prove a little **too** exciting. But I've learned a lot here, and I feel I'm well-prepared for life after college."*

As you try to find the college or university best suited to you, the views of Columbia presented above may be helpful. Keep in mind that these students might have had similar positive or negative experiences had they attended a different university. At any college, it is important for the individual student to seek out challenging academic experiences and the best professors, and to create a social life that best fits his or her personal style. ■

Note: The students quoted in the College Review Series are expressing their own views, which are not necessarily those of JHU or CTY.

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CREATIVE MINDS

ImaGiNe...

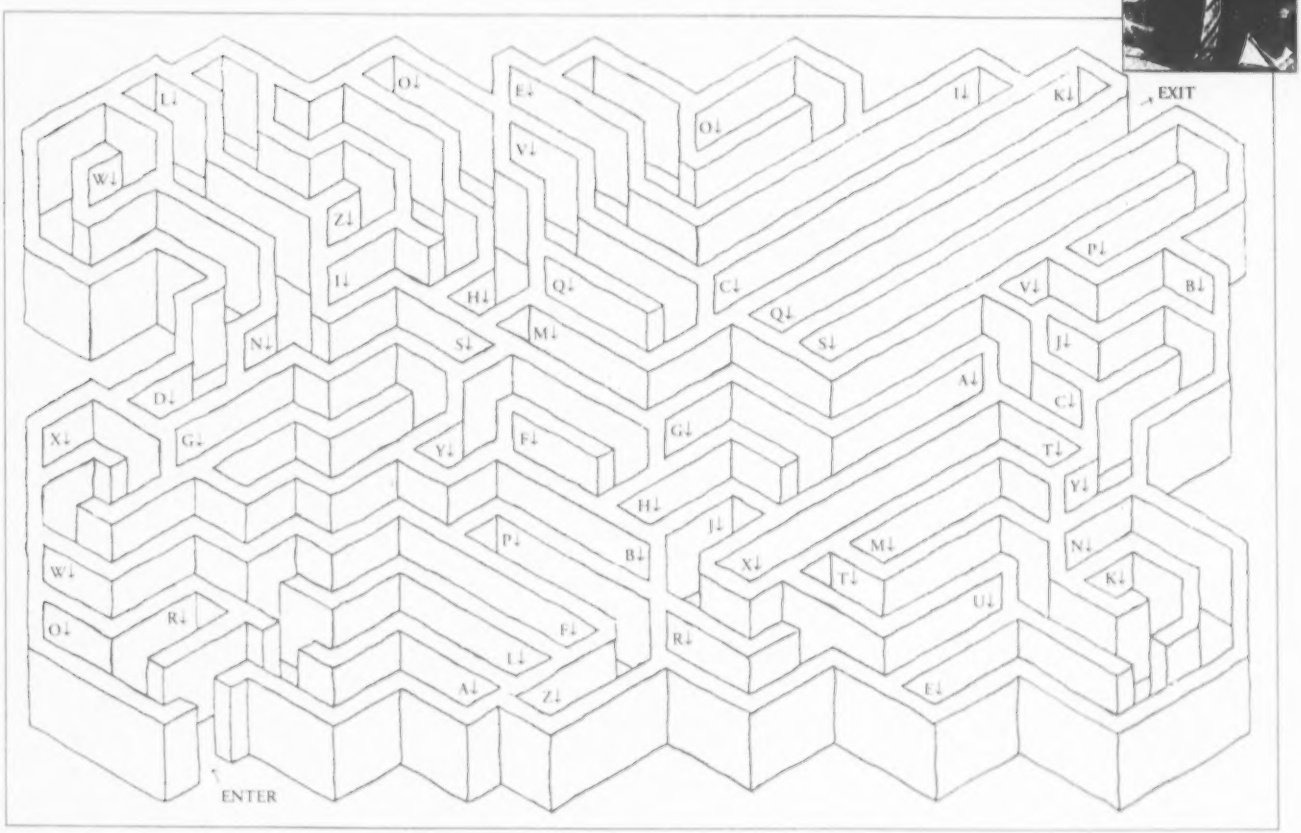
Submit your creative work—brain teasers, short stories/essays/book reviews. We look forward to hearing from you.
Please write to Imagine • SET at CTY • The Johns Hopkins University • Baltimore, MD 21218.

Another Puzzle

by Tim Boester

Directions: Once again, the goal is to begin at the beginning and make your way to the end. Letters indicate site-to-site transporters. When you reach a letter, transport to the same letter elsewhere in the maze.

*Fascinated by mazes and puzzles, **Tim Boester** is also intrigued by roller coaster design. Tim attends the University of Chicago, where he is studying physics and math.*



Book Review

by Alejandro Jenkins

In the hectic world of modern physics, breakthroughs take place so rapidly that books may become outdated after a few short years. Roger Penrose, a British mathematician from Oxford, wrote his now famous book, ***The Emperor's New Mind***, in 1988. It is today, however, a highly acclaimed work that stands, in terms of content and treatment, between popular science pieces such as *A Brief History of Time* and more advanced physics treatises. The author manages to make relatively complex ideas about computers, mathematics, and physics appear clear and simple to the layperson, without refusing to go into depth in the analysis of the topics covered. He presents and masterfully defends a provocative hypothesis: that the full functions of the brain cannot be reproduced by computer algorithms, no matter how complex.

The work is subtitled, rather ambitiously, "Concerning Computers, Minds, and the Laws of Physics." However, the book lives up to the expectations created in the reader by such a preamble. It takes the reader through a very broad set of topics, including Turing tests, Gödel's theorem, entropy, quantum mechanics, quasicrystals, and neurobiology. Penrose does so with incredible clarity and originality. Everything fits in for what seems to be a logical conclusion.

The author's basic purpose is to disprove the claims of "strong AI (artificial intelligence)" proponents who believe, in the words of one advocate, that "the brain is just a computer made of meat." More technically, they claim that all brain processes are algorithmic, that is, involving strings of instructions in the form of "if...then..." statements and mathematical calculations. All computer programs are algorithms, encoded via programming languages. According to strong AI proponents, the brain

continued on page 17

VOLUME 2 • NUMBER 5

Imagine

Opportunities and Resources for Academically Talented Youth

May/June 1995

Open letter to Imagine readers... 2

Foreign Language Competitions: Promoting the Study of Language, Literature, and Culture 3

Why Become Proficient in a Foreign Language? 4

Making Your Overseas Experience Worthwhile 5

Family Sabbatical 6

Junior-Year Exchange Program 7

International Summer Study 8

International Volunteerism, So You Think You Want to Study/Live/Work Abroad 9

A Design of Love 10

Jeopardy! 12

Poem: Apprehensive 13

Fascinating Classics: My Name is Asher Lev 14

Recentering the SAT 16

The Coach's Corner 17

Students Review MIT 18

Creative Minds Imagine 20

Spotlight On

Foreign Languages & Study Abroad

AATG Summer-Study participants and counselors on a field trip to historic sites in Germany (see page 3).

Mayan Ruins . . . Egyptian pyramids . . . the Great Wall of China. Visions of past worlds need not be limited to history books, and views of the modern world need not come only from TV documentaries. These days international travel is, for most of us, in the realm of the possible.

Pick a point on the globe. You may want to embark on an overseas exploration with a pack on your back and a compass in hand. Or if you're less adventurous, you may choose from a wide range of more structured travel and study options.

While you're planning that ideal trip, remember that the study of other languages and cultures is indispensable to a well-rounded education. The process of coming to know and appreciate another place and its people brings its own invaluable rewards. It also adds to your understanding of yourself and your own country. And familiarity with different cultures is fast becoming a requirement for success in most fields of endeavor: business, science, education, and the arts all draw from understandings that are global in scope.

So pick a point on the globe. Sign up for a language class. Enter a language competition. Read about Kazakhstan or Katmandu, even if the language isn't offered in your school. Explore ways to spend time studying, working, or volunteering in another country. And don't forget to dream. ■

Open Letter to *Imagine* Readers

"It was the best of times, it was the worst of times . . . "

This opening line in Charles Dickens' *Tale of Two Cities* refers to conditions in 18th century Paris during the French Revolution. But it could equally well be used to describe today's educational opportunities for academically talented precollege youth.

Only at rare moments in our nation's history—such as the post-Sputnik era of the early 1960s—has the country's political agenda overlapped sufficiently with the needs of academically talented students to make high achievers the focus of educational reform efforts. This is not one of those moments. As today's schools struggle to offer equal educational opportunities to all, programs for gifted and talented students are being dismantled, funding eliminated, and grouping by ability and/or achievement attacked. With respect to programmatic initiatives for academically talented students, it is the worst of times.

Yet, many bright, motivated students are achieving in ways and at levels that suggest it is also the best of times. Record numbers of students are participating in talent searches and academic summer programs. The Advanced Placement program has expanded dramatically. Specialized high schools and early entrance college programs have evolved to accommodate adolescents in need of advanced coursework. The quality of projects submitted by high school students to competitions such as the Westinghouse Science Talent Search approaches professional levels. And the 1994 United States team took first place in the International Mathematical Olympiad, with all six team members earning perfect scores—a unique accomplishment in IMO history.

As these facts demonstrate, academically talented students *can* obtain an appropriately challenging precollege education in the 1990s. However, with school programs disappearing, locating appropriate opportunities and resources takes individual initiative. In fact, *you* can devise a network of educational experiences to suit your own unique needs better than any one program possibly could. To begin, follow these guidelines:

- **Know yourself.** To define your needs, first consider your strengths, weaknesses, interests, goals, and aspirations. If necessary, seek assistance in evaluating these aspects of yourself.
- **Take responsibility for your own learning.** Be an advocate for yourself. Read *Imagine*, question teachers, and talk to professionals to find out about educational resources and opportunities. Then pursue them.
- **Demand curricular flexibility.** It may be unreasonable to expect your school to develop a differentiated program entirely for your particular needs, but it is not unreasonable to request that you be allowed to take a class with older students or be given release time for a college course. If you need a greater challenge than standard coursework provides, work with school officials to devise a program that meets your needs through creative scheduling.
- **Recognize that learning occurs anywhere and everywhere.** Note that many of the exceptional experiences mentioned above occur outside school. When planning your personal agenda, consider summer programs, college courses, extracurricular activities, and leisure interests as important components of your precollege learning experience.
- **Coordinate in- and out-of-school experiences.** The value of out-of-school experiences for learning cannot be overemphasized. However, to avoid repetition and boredom, you'll want to discuss outside options with school officials. For example, before you take a summer math course, determine whether your school will allow you to test into a higher course in the fall. If such advancement is not possible, you may want to pursue enrichment courses that will not duplicate the school curriculum.

Don't sacrifice your precollege years while waiting for the current educational reform movement to change direction. Remember that you can achieve your full potential by taking advantage of the many opportunities for challenging and stimulating learning that exist all around you.

Linda E. Brody, Ed.D., Director
Study of Exceptional Talent

What's *Your* Opinion?

In preparation for next year, we would appreciate hearing from our readers. What are your favorite regular features in *Imagine?* What particular articles have been most interesting to you? What would you like to see covered in future issues?

Send your comments to the editor by e-mail, fax, or snail mail (addresses in the box below). We look forward to hearing from you!

Imagine...
*Opportunities and Resources for Academically Talented Youth**

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SET Director • Linda E. Brody, Ed.D.
Research Associate • Carol C. Blackburn, Ph.D.
Staff Writer/Editor • Susan B. Hellerman
Staff Writer • Lesley Mackay
Contributing Writer • Charles Beckman
Administrative Assistant • Patricia A. Wade
Designer, JHU Press • Lesli M. Lai

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Toll-free: (800) 548-1784

Address editorial correspondence to:
Susan B. Hellerman
SET at CTY
The Johns Hopkins University
Baltimore, Maryland 21218
Phone: (410) 516-0309 • FAX: (410) 516-0108
E-mail: setcty@jhunix.hcf.jhu.edu

Foreign Language Competitions

Promoting the Study of Language, Literature, and Culture

Foreign language contests, unlike the individual or team events available in other academic subjects, consist primarily of written examinations administered once a year at participating schools. Like all tests, they may be useful for measurement, placement, and diagnostic purposes. But their broader intent is to encourage students to pursue the kind of comprehensive language learning that facilitates interaction with another culture on the fullest and most enriching level—communicating clearly in the vernacular, reading literature in the authors' original words, and maneuvering with increased ease in an unfamiliar environment.

Foreign language exams take about an hour and rely on multiple-choice questions to test grammar, syntax, reading and listening comprehension, historical background, and literature. In addition, exams in modern languages test the student's understanding of contemporary idioms and cultural materials such as ads, menus, and transportation schedules.

Along with their test scores, students receive information about their national ranking, and high scorers receive certificates of achievement. Some foreign language competitions offer additional prizes. For example, the program that sponsors the National Latin Exam accepts applications for $1,000 scholarships from high-scoring 12th graders who agree to take a year of Latin or classical Greek in college. And students who score in the 90th percentile or above on the National German Test are eligible to apply for an all-expenses-paid month of travel and study in Germany.

National associations also encourage formation of high school language clubs. ■

Le Grand Concours
National French Contest
American Association of Teachers of French
Box 32030
Sarasota, FL 34239
(813) 365-3028

National German Test
American Association of Teachers of German
112 Haddontowne Court, #104
Cherry Hill, NJ 08034
(609) 795-5553
fax (609) 795-9398

Students compete in a toga contest at NJCL Convention.

NJCL Convention

In addition to co-sponsoring the National Latin Exam, the National Junior Classical League also organizes a yearly six-day event for Latin students and teachers, held on a college campus. Activities include speakers, workshops, intellectual and athletic challenges, spirit days, creative/graphic arts competitions, costume contests, and other types of Roman fun and games.

The theme for the 1995 NJCL Convention, scheduled for July 30-August 4 at the University of Kansas in Lawrence, is *Aut Viam Inveniam Aut Faciam* ("Either I will find a way or I will make one.").

Geri Dutra, National Junior Classical League, Miami University, Oxford, OH 45056-1694; (513) 529-7741, fax (513) 529-7742.

National Latin Exam
American Classical League/
National Junior Classical League
P.O. Box 95
Mount Vernon, VA 22121
(703) 455-6779

National Greek Exam
Professor Ed Phinney
Department of Classical Studies
Box 33905
University of Massachusetts
Amherst, MA 01003-3905
(413) 545-5780

Euclide Gilbert French Language Foundation
(limited to 7 northeastern states)
P.O. Box 935
Manchester, NH 03105
(603) 627-0505

Why Become Proficient in a Foreign Language?

by Dr. William G. Durden

When I was asked to jot down some thoughts concerning the value of learning a language other than English, I could not accept the assignment without assessing simultaneously the value of travel. For me as a child, it was really the expansive, adventuresome, and sometimes unpredictable appeal of travel that well preceded my real and lasting commitment to learning other languages.

I grew up in a family whose members viewed travel as both a welcome beacon and a calling tinged with regret. Rather than hearing as bedtime stories the traditional fare of Mother Goose, Peter Pan, or the Brothers Grimm, I would get a hearty, if somewhat exaggerated, dose of the adventures of family members past.

I would hear, for example, of the experiences of two great-great-grandfathers who were sea captains in the great 19th century mercantile schooner trade, traveling the waters from Scotland to the West Indies to America.

To affirm that these tales were not pure myth, I was shown on rare occasions a box of letters from one Captain James Small to his mother. In these missives home, he would describe for her, with all the awe of a soul-affecting encounter, what he saw and felt at sea and on land, meeting different people and experiencing different customs throughout the world. These brief viewings of letters piloted my first glimpses into a future academic career for myself.

So my childhood view of life's adventures—all derived from the experiences of people related to me—included riding the high seas, traveling to diverse parts of the world, and recording what was encountered.

Of course, the frightening part of these tales—very much in keeping with the scary, but maturing, value of fairy tales (à la Bruno Bettelheim in *The Uses of Enchantment*)—was that they included the possibility of danger. Both of my seafaring great-great-grandfathers died in terrible storms when, as was expected of captains, they went down with their ships. Adventure, human limits, and dignity thus were early linked for me with travel.

Added to these distant travel tales were two closer renditions. One was the story of my grandfather, who was a battleship designer at the Brooklyn Navy Yard during World War II and lived to hear of his ships' being sunk at Pearl Harbor. The other was the saga of my own father.

Leaving home in rural, dirt-poor Alabama at 15 (a bit of chicanery, no doubt) and enlisting in what was then the Army Air Corps, my father began a life that for some 30 years was rooted in constant movement throughout the world. (I was born after my father finally stopped traveling.)

The allure and romanticism of his travels, both domestic and international, became woven into the fabric of my growing-up narrative. I would hear from him stories of his wanderings overseas in the Army, Navy, and Air Corps—*never* about being a soldier, but always about the young farm boy seeing the details of the world through big, quizzical eyes—and of other stints, as a minor league baseball player in Wyoming and as a rancher in California.

For hours I would look at picture books my father had brought from military service in Panama and Trinidad. When he went through the pictures with me to explain what I was seeing, I had no doubt that for him this travel, this experience of distant lands, held a power for self-definition that was inestimably important.

Yet my father also told me that *passing through* places was not enough—that for him, too, there was a limitation. He had remained merely an uncomfortable visitor; few lasting traces remained in him as a result of such contact.

Here was a new message for me about the constraints of travel: merely traveling, merely being the self-contained tourist, builds regret. Nothing remains in your soul—you have in no way been attuned in behavior, definition, or style by your incomplete encounters with others. Passing by on the outside, you have missed so much of the variety and substance of the life taking place within.

It was at this point in our dialogue, when I was about eight, that my father suggested that one way I could get closer to the souls of others throughout the world was to learn other languages. He had always regretted that his early poverty and consequent lack of education had not permitted him to do so.

Talking with people in their own language—a language other than your own—socializing with them in their language, understanding their particular views about the world and people through the possibilities of their language, or simply eavesdropping on a conversation in another language, all provide invaluable glimpses into their lives.

One of the most liberating aspects of language-learning is that sometimes that which is impolite conduct in your regular environment becomes pedagogically sound abroad. Eavesdropping, for example, is deliciously instructive; television-watching unremittingly reinforces grammar, syntax, and semantics.

Thus, travel is transformed from mere movement to the character-building, maturation process that only inhabiting another's language can provide. To me, language is the house of the soul. The more languages you know and the more you exercise those languages through travel, the grander and more spacious your soul may ultimately be. ■

Dr. William G. Durden *first traveled overseas to live with a German family at the age of 15 and has never stopped traveling since. He studied at three overseas universities, including the University of Basle, Switzerland, where he was a Fulbright Scholar. Director of CTY, he is also an adjunct assistant professor of German at Johns Hopkins and chairs the U.S. Department of State Committee on Exceptional Children and Youth, which keeps him traveling, talking, and eavesdropping throughout the world.*

Making Your Overseas Experience Worthwhile

by Lesley Mackay

The key to meaningful overseas experience is bringing the adventure inside you, mirroring the peaks and valleys of your travels with an equally challenging inner voyage. Language learning and commitment to a project may be the best ways to realize your dreams of foreign adventure on the deepest level.

When I was a young girl, I was enchanted by my globe, a sky-blue metallic planet that spun on its creaky axis, setting pink and yellow land masses awhirl. I liked its spherical shape and map markings; I memorized the positions of its black specks, signs of the world's metropolises. I fell in love with distant points, or at least with their names: Santiago, Siberia, Syracuse.

I still recall—at the age of 14—boarding the plane for my first solo international flight, to spend the summer with relatives in Europe. I remember resting my clammy forehead against the seat in front of me and reaching out for the sleeve of a stranger at the moment of takeoff.

A few years older and—I thought—a lot more sophisticated, I made the standard college-age pilgrimage back to that continent. I sampled paintings, *pensions* (boarding houses), and pastry. But although I was captivated by my new surroundings, something was awry. Like a butterfly caught in a net, I felt held back from the places and people I had traveled so far to see.

How to experience the world up close? The answer, I determined, lay in the purpose of my travels. Next time I ventured abroad, I needed bigger goals, more time, and a way to weave myself into the life around me. In other words, I needed a project. I decided that my next overseas experience would be long term, and that upon arrival I would throw myself into some kind of work. As a working person, I reasoned, I would have a better chance of moving from outside to insider in my new environment.

It worked! Not too long ago, I spent a year in Bolivia in the heart of South America. I went to that country to work on my Spanish, to realize my dream of participating in a community-based endeavor in Latin America, and also to experience life in a region in which most of the population is indigenous (70% of Bolivians are Native Americans). Before departing, I made arrangements to teach in a U.S.-privately-funded orphanage in Cochabamba, a town of 300,000 in the foothills of the Andes.

One of the ironies of overseas work is that it often entails teaching—that is, assuming an air of knowledge and authority in a situation in which you are often, well, clueless. Warning: This state of affairs can induce bouts of helpless laughter from both you and your students.

Working with young people was an excellent way to transcend the awkardness I felt as an outsider in a fairly insular culture. Although I didn't consider myself a great success as my students' teacher (in part, I was limited by my struggles with Spanish), I think I did a good job of being their friend. Secretly, my favorite part of every day was playground time, when we engaged in deadly serious games of tag and basket-shooting.

In Bolivia, I came to feel closer to local life than I would have guessed was possible. On one hand, I tried resolutely to overcome my differentness—to improve my Spanish, imbibe social norms, and immerse myself in local life. On the other hand, I also experienced moments when I felt strongly connected to the people around me.

A very special hour for me in Cochabamba was always my bus ride home from work at about seven in the evening. I would board the minibus downtown, midway through the route that began at the enormous complex of street markets known as the *cancha*. The bus would be full of women who had spent the entire day selling their wares. They were returning home with eggs, potatoes, onions, sometimes flowers or a live chicken—whatever they had bartered for over the course of the day.

These women were Quechuans, descendants of the ancient Inca empire. They spoke the local language—Quechua—and wore the long braids, hooped skirts, and straw hats of their tradition. I don't know what they made of me in my Converse sneakers, but after I began showing up regularly, the women started to smile, nod, and make a space for me on the crowded, cracked plastic bus seats.

Sometimes they even sent a joke or a question my way. Their words were always beyond me, but some evenings as our bus climbed the foothills of the Andes, with the sun setting and their onions and potatoes spilling over my feet, tears would fill my eyes when one of them smiled or spoke to me. I think it was my presence on the bus every day that made me a little less foreign, a little more like someone who belonged. Like them, I was coming home from work. I wasn't just absorbing their culture; I was trying to give something back.

Working when you are abroad, like learning the local language, signals your commitment to the other culture. By investing yourself in what you find there, you also express respect for the people who are accommodating you in their world. ■

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Family Sabbatical

by Anna Salamon

KOKKEDAL, DENMARK • February 1994

I usually live in America, but right now I am spending a year in Denmark. My father is a mathematician at San Diego State University; every seven years he gets to take a sabbatical and work for one year in another country. During his last sabbatical, we also lived in Denmark. I was in kindergarten then, and by the time we left, my Danish was pretty good. But over the course of seven years, I'd managed to forget almost everything.

When we arrived towards the end of August, school had already been in session for three weeks. I enrolled in the seventh grade, which is part of the Danish elementary school. In Denmark you keep the same classmates and teachers from kindergarten to ninth grade. I'd say that this, more than any other single factor, is responsible for the warm, accepting atmosphere of Danish schools. When I arrived, the first to join the class in three years, everyone wanted to be my friend.

On the first day, I was really nervous. All I could say was yes, no, and thank you. But the other kids spoke English. I soon learned that kids here take English from the fifth grade on; by seventh grade, they're reasonably fluent.

Although the other kids speak English to me, the classes are in Danish. At first it was just too hard. I participated in German and math, but in all the other classes I did beginning Danish work. However, my Danish came back fast, and I began participating in the other classes, one by one. Now I participate in everything, and I always speak Danish to my friends. This puts me in an excellent position to compare the two cultures.

In Denmark, a class of 23 students is considered large. Teachers here specialize in a few subjects right from the beginning, so they know what they are teaching. My math teacher here is familiar with geometry and trig, whereas some elementary school teachers at home have trouble with pre-algebra.

Teachers trust kids a lot more here than they do at home. Danish students are allowed to leave school during recess and lunch from first grade on, but no one bothers to take attendance. Once a week we just say whether we've been here, and they write it down. Also, if we are feeling sick, we can just say so and go home.

On a typical day, I get up at 7:20, eat breakfast, and bike a mile to school. School starts at 8:35 and is made up of six 45-minute periods with 10-minute breaks in between. My schedule includes Danish, English, German/French, geography, physics, math, history, biology, Christianity, physical education, and electives—the choices this semester were cooking, woodworking, music, and sewing.

Even now that I speak Danish, my school day isn't completely normal. We get about half an hour's worth of homework, and even if it takes me a little longer than the others, I can almost always finish it during English.

The other thing I do differently is math. At first I did math with the rest of the class, but I had already learned everything in their math book (a blend of pre-algebra, arithmetic, and basic geometry). In Danish elementary schools, there are no advanced classes. Instead, I just asked if I could work in my Schaum's *Outline Geometry* book during math, and they said OK.

After school, almost every Danish child from kindergarten to ninth grade attends a *fritidshjem* (literally, "free-time home"). Our neighborhood *fritidshjem* is the Bøgen, where there is a gym and a room for every imaginable activity: computers, clay, legos, sewing, board games, cooking, etc. I stay there until five or six, then I come home, eat dinner, and go to sleep.

In Denmark, gas is almost three times as expensive as in the U.S. A two-car family is virtually unheard of; many families don't even have one. Because of Denmark's excellent bike path network, bicycles are probably the most common means of transportation, followed by buses and trains. These factors give Denmark smog- and traffic-free neighborhoods. It also means that I can get around just about as easily as my parents.

A middle-class Danish family will have a 50-60% income tax, but they get their money's worth. Denmark has a national health care system, so no money is wasted by double coverage. They also have great car/foot/bike roads, a good unemployment system, and an excellent school system. The *fritidshjems* are also heavily subsidized: you can go there from noon to nine in the evening for about $2 a day.

Denmark's population is very well educated, mostly due to their excellent university system. In Denmark, you don't have to pay to go to college. In fact, college is considered a student's job; they get paid about $600 a month.

Denmark has no homeless. If you don't have a home, the government gives you one. If you are unemployed, for the first six months you get 80% of your previous salary for unemployment benefits. After that, if you still haven't found a job, the government will give you one.

Despite Denmark's many advantages, there is one area in which we are far ahead: diversity. Everywhere you look in America, there are people of different races, cultures, and nationalities. In Denmark, everyone looks and acts pretty much the same. There are very few foreigners, and the Danes have a national religion which is taught in school. Essentially, everyone is thoroughly Danish.

Both cultures have their strong and weak points. I enjoy it here, but I miss America, and I'll be glad to go home. ■

Anna Salamon, *shown above preparing to bike to school with her brother David on a snowy Danish morning, returned with her family last summer to San Diego, where she now attends 8th grade. Anna enjoys learning mathematics at home with her father.*

These two correspondents wrote to us while living abroad for a year, coincidentally both in Denmark. Anna was a 7th grader living with her own family, Rebecca an 11th-grade exchange student. From different perspectives, they discuss their experiences of adjusting to a foreign culture.

Junior-Year Exchange Program

by Rebecca Swank

GRANAA, DENMARK • October 30, 1992

Being an exchange student has completely changed my life. I am learning to live without my parents' help and guidance. When I have a problem or question, I have to figure out for myself what to do. That can be hard when you are 16 and in a country that is very different from the U.S.

I have successfully adapted to life in another culture. I am learning the Danish language and am gaining tolerance and respect for other people. When foreigners have trouble speaking English, I can really relate to their feelings that they will never become fluent.

In the U.S., I found school to be easy and boring. Here, I must concentrate all the time in order to know what the teacher is talking about. I also am learning to deal with ambiguous situations. (I lost my gym class once when they went to play volleyball a few blocks away.)

Another exchange student and I tried to teach our gym class how to play baseball. Denmark will have trouble getting a team in the World Series; we couldn't get a baseball or bat, so we ended up playing an interesting version of softball using a tennis ball, cricket bat, and no gloves. The concept of being "out" was difficult to explain; the class translated it into Danish: *ded* (dead).

The Danish school system is very different from the American system. I stay with the same classmates during eight classes. I also take another class, chemistry, which I chose. Our schedule is different every day of the week. School is going really well, and I have impressed my math, chemistry, and English teachers.

Denmark has a nationalized curriculum, and opportunities for advanced math are few, if they exist at all. My math class is beginning to learn derivatives, which I learned two years ago. I knew when I applied to be an exchange student that I would not be able to take math at a level appropriately difficult for me, but felt that I could gain much more by spending a year abroad. After three and a half months in Denmark, I can see that I've made the right choice. There's more to life than differential equations.

P.S. I play clarinet in a community band. I also played goalie on a soccer team for my school in a tournament and in a very important game between my school and another. We won, 9-2!

February 12, 1993: In December, I took the SAT in Copenhagen. I survived the seven-hour trip back to Grenaa: walk to train station, take three trains, wait an hour in a little station with a grumpy lady behind the counter, take a bus, take a ferry, take a taxi. (I later learned I could have taken a bus from Copenhagen to Grenaa!)

I also took part in the national Georg Mohr Math Competition for high school students. Out of over 450 participants, I'm one of 19 declared winners. I've been invited to attend a Winner Seminar in Aarhus in March and also to participate in the Nordic Mathematical Contest on March 17 (which is also my 17th birthday); the results of this Contest are used to select the Danish team for the International Mathematical Olympiad.

The hardest part of taking these tests is trying to translate the math I learned in the U.S. into Danish. Although my Danish skills are getting pretty good, I'm going to ask if I may do the Nordic Mathematical Contest in English.*

Speaking of Danish (as opposed to speaking *in* Danish), I got a 10 on my first essay in Danish. The highest possible score is 13 (perfect), and 10 = *A*. As my mom put it, I've had good practice with alphabetical order, looking up words Danish-to-English so I could read what I should write about, then English-to-Danish as I wrote it. I've been concentrating on my Danish so much that when I called my mom today to tell her about the Georg Mohr competition, I made some strange mistakes in English.

June 2, 1993: Just returned from an 18-day Eurotour with other exchange students. Saw *tons* of stuff and had *masses* of interesting experiences: Berlin and the Checkpoint Charlie museum, a concentration camp in the Czech Republic, a dead man in Amsterdam (said to have committed suicide), the Red Light district in Amsterdam (who can have any dignity standing in a window wearing underwear?).

After seeing the state of the world, or at least some of it, from the riches of Monaco to beggars all over Europe, I just can't say that I'll lock myself into a laboratory and work with chemicals for my whole life. Sure, that work is useful and necessary for society, but I can't just ignore all that I've observed. Humans are interesting creatures, and there is much more to a person than can be expressed through a DNA molecule. I would much rather die fighting for something I believe in than die old and bored.

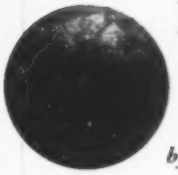
So now my plans for the future are more laid back. For the short term, I plan to return home, adjust to life there, eat all the foods I've missed (but not gain weight), and keep my Danish biking muscles in shape. For the long term, beyond college, I'd like to enjoy life, improve the world, avoid unnecessary stress and unhappiness, think, do something I believe in, live near a forest, and search for the Truth. I now consider these to be more important than winning the Nobel Prize. ■

May 1995: *I'm now finishing my freshman year at Carleton College in Northfield, Minnesota. I plan to major in math and perhaps also in religion. Eventually, I might earn a Ph.D. in math or end up studying religion more. I think part of my interest in religion stems from my experiences in Denmark and search for Truth. Although the life skills that I learned in Denmark have proven most useful, even my knowledge of Danish is a plus: I am reading a Danish book about Kierkegaard and now want to read his work in the original.*

*Rebecca tied for 7th place nationally in the Georg Mohr Mathematics Competition. In the Nordic Mathematical Competition, she tied for 26th out of 68 participants from all member countries and again tied for 7th among Danish participants. The top six Danes formed that year's IMO team.

International Summer Study

Summer academic programs, which were the focus of our January/February 1995 issue, offer a broad range of options for study abroad. The following programs were not covered in that issue; call them directly about deadlines for summer 1996.



International Summer Science Institute

by Scott Rifkin

I stepped off the plane into the hot Middle Eastern sun, groggy after one hour of sleep, still savoring the taste of the incredible bagels El Al had served on the flight. Along with twenty other Americans and sixty other students from eighteen countries, I was in Israel for the International Summer Science Institute, an all-expenses-paid program conducted in English and held annually at the Weizmann Institute of Science in Rehovot.

The Institute opened with a three-day guided tour of Jerusalem. We visited the Wailing Wall and the Arab quarter and learned about the history of the ancient city, while constantly—and wisely—being reminded to use sunscreen, drink lots of water, and wear a hat.

Then on to Rehovot, where we entered the research part of the program, which focused on biology, chemistry, physics, mathematics, and computer sciences. These three weeks are designed not for original research by the students, but rather as an introduction to different areas of research and to the questions scientists ask to explore them. The Weizmann Institute is one of the best institutions in the world for such a program. Their facilities are state of the art and quite beautiful (one notices the trees more than the buildings). And the mentors, in general, are quite willing to teach and explain.

Institute scientists presented their work, and we chose projects. I studied chaotic system control, writing computer simulations and assisting my mentor, Yaniv Bar-Ad, with an experiment on the frontiers of this field. Starting with a "Gleickian" knowledge of chaos (obtained from reading James Gleick's book), I delved into the field, guided by my mentor who gradually fed me papers until I understood the theoretical framework of his research. At the end of the laboratory period, we each wrote a thesis and made a seminar presentation about our work.

Just as important as the research component is the experience of being with students from around the world, each with different backgrounds, ideas, and opinions. About eighty of us shared the month in Israel, cruising on the Red Sea, exploring Nimrod's Fortress in the Galilee, and floating on the painfully salty Dead Sea. Israel is unique: the terrain changes every twenty kilometers, from arid desert to fertile, although irrigated, vegetation; from the mountains of the Golan Heights to the depths of the Dead Sea. It is a land teeming with history, and I felt a sense of awe as I stared at two-thousand-year-old, perfectly preserved glass plates and parchments, which had always seemed fictional but were now displayed before my eyes, their treasures legible (if only I understood Hebrew).

The program's last week really captured the beauty of Israel, as we traveled in the Negev desert conducting field research in life systems, geology, and climatology. We hiked at Ein Gedi near the Dead Sea, capered with ibex (a kind of wild goat), savored Bedouin tea, watched the sunrise after ascending Masada, and slept near the salt caves while the stars danced above us. We forgot our different ideals and ethnicities and simply enjoyed each other's company.

The International Summer Science Institute is completely free, including airfare, and is a great way to explore a field on the frontier of science, see Israel, and meet students from all over the world. I encourage Imagine readers who will be high school seniors this fall to apply for next summer. ■

*Now a sophomore at Harvard, **Scott Rifkin** attended the International Summer Science Institute in 1993. He has set aside chaos theory to try to find a niche combining the fields of evolutionary biology, cognitive science, developmental genetics, and cetology. Until then, he plans to schmooze with dolphins in Florida and distract himself with good books.*

Dr. Bessie F. Lawrence International Summer Science Institute, American Committee for the Weizmann Institute of Science, 51 Madison Avenue, Suite 117, New York, NY 10010; (212) 779-2500, fax (212) 779-3209.

ARML Math Camp

The American Regions Mathematics League, U.S. Information Agency, and Symposia Conferences of Moscow jointly sponsor ARML-Russian student exchange programs. During the summer Math Camp, which has taken place every other year since 1991, American students are exposed to the unique Russian style of high-level mathematical education. Other activities include trips to Moscow and St. Petersburg and participation in the Russian mathematics competition, Tournament of the Towns. ■

Eric Walstein, ARML U.S.-Russian Coordinator, c/o Montgomery Blair High School, 313 Wayne Avenue, Silver Spring, MD 20910.

Foundation for International Education/ Oxbridge Academic Programs

Director James G. Basker, who holds degrees from Harvard, Cambridge, and Oxford Universities, has designed student programs in Europe for fourteen years. He is also a professor of English and director of the First-Year Seminar Program at Barnard College, Columbia University. These three programs take place during July.

- *The Oxford Tradition*, Oxford University, England (ages 15-18): Academic subjects and creative arts taught by Rhodes Scholars faculty, Oxford professors, art historians, barristers, and other experts in specific fields.
- *Academie de Paris*, University of Paris, France (ages 15-18): Introductory courses in French history, art, and culture; tours of art museums, ancient cathedrals, and other historic sites.
- *The Cambridge Experience*, Corpus Christi College, Cambridge University, England (9th graders): Intensive writing courses and core curriculum focusing on major movements in Western civilization. Small-group teaching; faculty in residence with students. ■

Oxbridge Academic Programs, P.O. Box 250328, Columbia University Station, New York, NY 10025-1535; (800) 828-8349, (212) 932-3049, fax (212) 663-8169.

International Volunteerism

Join Amigos & Make a Difference

Want to immerse yourself in a foreign culture, develop decision-making and leadership skills, practice your Spanish or Portuguese on a daily basis, and perform a crucially needed community service? Here's your ticket. . . .

The international non-profit organization known as *Amigos de las Americas* (AMIGOS) recruits, trains, and places high school and college students in summer public health projects throughout Latin America.

Terms in the host country last for four, six, or eight weeks. Volunteer teams make house-to-house visits and work in health clinics and schools. The host country provides food and housing in or near project villages.

AMIGOS volunteers work hard and are given responsibility often reserved for adults, so the training is intensive and experiential. In addition to the technical skills needed by village health workers, volunteers are taught cross-cultural sensitivity, self-care in a foreign environment, and community management techniques. AMIGOS veterans participate in training new recruits and serve as field staff overseeing volunteers in the villages.

If you're interested in becoming an AMIGOS volunteer during the summer of 1996, you need to join a branch of the organization and begin the training/fundraising process now. AMIGOS requires that you be at least 16 by June 1 of the year of planned field participation and that you complete at least one year of high school Spanish or Portuguese (or the equivalent) before beginning training. ■

AMIGOS, 5618 Star Lane, Houston, TX 77057-9927; (800) 231-7796 or (713) 782-5290.

The Peace Corps and More: 120 Ways to Work, Study, and Travel in the Third World by Medea Benjamin (100+ pp., $8.95). A Project of Global Exchange, 2017 Mission Street, #303, San Francisco, CA 94110.

So You Think You Want to Study/ Live/Work Abroad . . .

Two of Our Writers Offer Words to the Wise: Look Before You Leap!

Sure, it *sounds* romantic. But remember that foreign living involves immersion in the unknown. Before you commit yourself, reflect on the very real challenges you will encounter in your new environment.

How well do you cope with unfamiliar settings and with unpredictability? Do you enjoy or detest improvising in a second language? Do you feel challenged or threatened by unfamiliar, perhaps even (to you) unattractive, social rules?

The nitty-gritty of finding your way in a different culture can be overwhelming. Some transplants fall prey to homesickness or just plain sickness. Meals become exercises in faith. ("I don't know what this is, but I'd better try it so I don't offend my host.") Everyday events can turn into hair-raising adventures.

Such trials are commonplace, whether one is adjusting to life in Madrid or Marrakesh. Even in English-speaking countries, young Americans may experience *culture shock*, the sense of malaise and confusion that can afflict those trying to make their way in a foreign land. As its name implies, culture shock can be traumatic. But on the positive side, this condition indicates that you are absorbing information about your new locale at a rapid rate. Eventually, the feeling of being out of place should subside, and you will become more confident.

Overseas living is certainly challenging and probably not for everyone. But depending on how much you are able to give of yourself, the rewards of living abroad can be amazing and personally transforming.

—Lesley Mackay

I would very highly recommend being an exchange student to anybody who wants to see and live in another part of the world and learn more than just book-knowledge.

This experience is not for everybody, though, especially those who are highly perfectionistic, are not ready to experience failure or different cultures (even some things that one may find offensive), or are only interested in learning academics at a high level.

Many exchange students go abroad during their junior or senior years of high school. The application process for most programs starts during the fall of the year before departure. If you're interested, talk to your guidance counselor about programs for the year, semester, or summer.

—Rebecca Swank

While you consider whether living abroad suits both your interests and your personality, you can be gathering information about your many options.

If intellectual ventures appeal to you, many well-structured summer academic programs exist to guide you through immersion in a foreign language or expose you to topics of regional interest such as ancient civilization in Cairo or Irish literature in Dublin.

If you prefer less structured learning experiences, you may enjoy hands-on projects such as harvesting crops on an Israeli kibbutz, inoculating children in a Colombian village, or working on a Turkish archaeological dig.

Of course, you'll want to thoroughly research any organization on which you would become even partially dependent while in a foreign country. Examine all promotional literature carefully, seek complete answers to all your questions, and talk with other students who have recently participated in the same program. ■

Going Places: The High-School Student's Guide to Study, Travel, and Adventure Abroad Short- and long-term overseas opportunities for students aged 12-18 (Council on International Educational Exchange, 1993-94 edition, $13.95). Available in bookstores or from St. Martin's Press, 175 Fifth Avenue, New York, NY 10010.

A Design of Love

by Priya Venkatesan

Because of their family's heritage, many students living in America are fortunate enough to have one foot in another culture, too. Moving back and forth, they gather experience in one world that illuminates their life in the other.

In the South Indian culture, the leafy plant known as *marudhani*—in the Western world, henna—is applied to the hands and feet according to an ancient tradition dating back over 4,000 years. When this plant paste is removed, the skin underneath is an orange color, which serves as a decoration much like nail polish. While in India three years ago, I experienced this ritual; and when I returned to the United States, I had a priceless souvenir that connected me to the other world I had just left, a link between my two cultures.

One August night, about a week after my family and I had returned from our six-week trip to India, my eyes were drawn to my decorated hands and feet. As I gazed, the color and shapes blended together, and a familiar scene came into view. . . .

I am sitting on the cold, hard cement floor, watching my father's mom, my *Patti*, cut the market-fresh vegetable that will, together with rice, be our dinner. Her small, weathered hands dice rhythmically; the knife hits the board at an even beat, which is alive in my mind. The uniformity of the cubes is a startling contrast to the diversity I perceive between her and me.

Looking around, I notice the worn walls hung with family pictures on all sides, lending a feeling of security and guidance from family in the past. Still gazing, I get up and go into the next room, where I join my cousins Mahesh and Poorna in a game of caroms. This is very similar to the familiar game of billiards, but instead of a cue stick and balls one uses one's finger and coins. The board itself is on the ground, and members of the same team sit opposite each other. The object of the game is to flick a cue coin with your finger to knock a different target coin into a pocket.

I carefully try to store the game rules in my memory, but later all I remember is my cousins' calm faces explaining, not their actual words. Their near-perfect English makes me feel very tense, and my embarrassment goes deeper than just not being able to speak my mother tongue; it also puts up a wall between us.

Only towards the end of our vacation does this wall really come down. The day of my *Thatha*'s (grandfather's) eightieth birthday begins at five in the morning with the religious ceremony for celebrating the occasion. Around ten, my cousins, their cousin Uma, my sister, and I troop up to the attic to escape the choking smoke of the ceremonial fire. Once there, we first stare at each other for a moment; then, at once, something changes. We begin to laugh and talk; when Uma suggests a game, we all agree. Although I do not know this game either, I do not mind; I feel like an adventurer, a discoverer. During the game I do discover something—friendship—because I ignore all language and cultural barriers. By the time we emerge for lunch, we are all great friends. Unfortunately, later on, this makes our goodbyes even harder—with my mother's family as well.

My Thatha and Patti on my mother's side live alone, in a house only about five miles away from my father's ancestral home. Poverty can be seen on their street just as in all of India, but the people are friendly, and as we approach their house I observe that life is not ugly and bare for them. At their house, I feel a welcoming embrace, the house's remembrance of me as strong as mine of it. There is no wall up here; our acquaintance has already been established.

Glimpsing a short, muscular woman, I remember Prema, the so-called "servant" of their house, who is really treated as a member of their small family. It was she who, on our first trip, ground up the homegrown marudhani leaves with lemon juice, and then guided the paste onto our hands and feet in a simple, yet authentic, design of shapes and lines. Shyly, she nods to me. Although we cannot communicate, as I speak no Tamil and she speaks no English, an emotion passes between us, one of understanding and remembrance.

I soon forget this, however, as my grandparents appear in the doorway. Eagerly awaiting the inevitable hugs and greetings, they rush forward, happy to be given back a small part of their family, even if only for a short while. Although we are a little formal with each other at first, a comfortable sense of belonging soon falls over me, and I find myself sitting with my arms around them, sharing my news. Simply because they are happy, I am happy; this, in my opinion, is the truest manifestation of love there is.

Sitting around the table, my family knows we are in for it. Dishes heaped with food my Patti has prepared just to make us rotundly plump cover every square inch of the table. She herself is hovering anxiously over the table, hoping for our approval. In a mixture of Tamil and English she encourages us, "Eat more, more! That is not nearly enough for you, my child. You must eat more." Fondly, I look at the lean and almost frail figures of her and my Thatha.

Beginning in Tamil, I say, "*Porrum* (enough). Now both of you must eat. I will serve you vegetables first." I spoon an equally sizable portion onto her plate, waiting for her reaction. I greet her protests with a warm laugh. "You must eat more, my Patti," I offer in return. Soon we all are laughing, not only from this remark but from the satisfaction we have achieved with this togetherness.

This precious bond is strengthened later when we stroll together through their extensive garden full of tropical plants, which my Patti uses in all her cooking. One plant in particular catches my eye, the marudhani plant, whose leaves are ground up into the paste used as a decoration.

Later that day, after our walk, Patti announces that Prema, who I discover is to be married, is ready to adorn my skin with marudhani. As I see her, I wonder if she will be gone when I return in a few years, and if she will have a new life. I hope for her that if this is the case, it will be a happy one. Side by side, my sister and I walk into the house and patiently await Prema's artistry with the leaf paste, the queen of all forms of adornment.

Spreading the mixture evenly over my soft, unworked palms, Prema forms an array of circles, lines, and dots, going clear up the fingers to the nails. As she works, I notice her hands; they show signs of hard labor, but still seem similar to my own. We are sisters of the same race, and recognize each other as that. As she is now ready for the soles of my feet, I brace myself for the cold, wet sensation the paste will leave. Although not entirely unpleasant, it does tickle and I am reduced to helpless laughter. As Prema puts on the finishing touches, my mother announces that I must go to sleep and allow the paste one night's drying, so that the following morning the color will be bright and bold. Readily complying, I quickly go to bed, but am unable to sleep.

While lying on the hard wooden bed, palms and soles facing outward so the marudhani can dry, I look out the window, thinking about the impoverished families who are forced to make their home on the street outside. Remembering my happy laughter the day before, I wonder if those families will ever freely laugh and experience such simple pleasures as those I have every day. It is easy to take adequate shelter and food for granted when one has never been needy. I ponder this unfairness again the next morning, when I stand at the outdoor water tap scraping away at the hardened, bottle-green covering of the paste, revealing the beautiful orange shade that now defiantly shows there can be worth under a mundane exterior. This symbol of worth, India's worth, is something I can carry with me to my home in America, so that I am always reminded just how blessed I am to have two cultures, two perspectives. . . .

So it was that I found myself again looking down at my hands back home a week later. India's beauty had not died out; it was still there, only perhaps a little fainter than before. Now, three years later, I remember every day that I am an Indian-American and belong on both sides of the wall imposed upon me. Instead of walking through life blindfolded, I search my hands, hoping to find the traces of wisdom from generations past, and counting on my memories of the people and the land that make up the blood inside me to give me some guidance in a divided world. ■

*Fourteen-year-old **Priya Venkatesan** is a 10th grader living in Pleasanton, California. She plays the flute in her school marching band and in a regional Youth Symphony Orchestra. Priya enjoys performing East Indian classical dance and music, as well as participating in math competitions, and she is a member of the school tennis team.*

JEOPARDY!

by Susannah Batko-Yovino

I have been a *Jeopardy!* fan since I was three years old—my grandparents got me hooked on the show when my parents were away for a month. I have watched it faithfully ever since and, like most viewers, have imagined being a contestant. So, starting when I was thirteen, I began my quest to compete in the annual Teen Tournament.

Each year, interested teenagers are invited to send in a postcard to apply to be on the show. Several thousand of these cards are drawn at random to determine which students will take the *Jeopardy!* qualifying test. Last fall, the third year I'd sent a postcard, I lucked out.

TRYOUTS

Early in November, my parents and I traveled to Philadelphia for the test and tryouts. Some of the tension I felt was relieved when we arrived and found that the hotel was hosting a *Star Trek* convention. Paying attention to the Trekkies, I almost forgot to be anxious.

My nervousness returned, however, when I arrived at the test site and saw many of the other kids reviewing their notes and books outside the studio. I felt a little guilty that I hadn't prepared, but there really didn't seem to be any way to study, other than to memorize the *Encyclopaedia Britannica*. I just wanted to have a good time and do as well as I could, without putting too much pressure on myself.

The qualifying test consisted of one hundred questions, read by Alex Trebek, the *Jeopardy!* host. While the producers corrected our tests, we had a short question-and-answer session with Mr. Trebek, who then read the names of the fifteen or so students who'd passed. (I was surprised that, when he came to my name, he remembered my winning the 1990 National Geography Bee, which he also hosts.)

Those of us who had passed the written test then took part in several mock *Jeopardy!* rounds, so the producers could see how we played the game. Next, we were each asked to talk about ourselves for a minute and tell what we would do with the money if we won the $25,000 top prize. (I said I wanted to buy my dream car, a black Saab convertible.) Both of these short sessions were taped, for further review by the producers.

After the tryouts, I had nothing to do but wait. Finally, a few weeks later, my mother called me at school with the good news—I'd made it! It was hard to conceal my excitement, but I managed to keep my mouth shut and tell only a few close friends. Ten or so. Who really spread the word. So, by the end of the day, almost everyone in school knew. Of course, I had to give everyone the run-down: how I got on, when I was going to California, when the show was going to be on TV.

Tapings in Los Angeles were scheduled for January 3 and 4. Fortunately, those dates came right at the end of my Christmas break, so I didn't miss too much school, but I was left with less than a month to prepare. The letter they sent suggested that watching the show was sufficient preparation. I supposed some kids would really knock themselves out studying, but since the categories are so diverse, I thought I'd actually be doing myself a disservice by trying to study everything. Again, I didn't want too much pressure; I just wanted to have fun and do my best. So I took their suggestion, and in the end, this was a good decision.

SHOW TIME!

The Teen Tournament is structured differently from the regular *Jeopardy!* shows. All fifteen contestants compete in the first week of quarterfinal rounds. Three different students play each day for five days, and each day's winner advances to the semifinal rounds. In addition, the four remaining contestants with the highest winnings are given Wild Card slots. The nine semifinalists play three games with three players each; then these three winners play two final games to determine first-, second-, and third-place

Because I wasn't obsessing about the competition beforehand, I think I felt much less nervous than some of the other contestants, and I was able to stay calmer on the outside, too. Another calming influence was Alex Trebek, a genuinely nice person with a true talent for making people comfortable. The conversations he has with contestants in the middle of the show are amazingly relaxing.

The actual game is just as exciting and fast paced as it seems on television. One big difference from what a TV viewer sees is that five shows are taped in one day. I spent eight or nine hours in the studio on both days when my segments of the tournament were being taped. It takes more than half an hour to tape each show, with downtime between segments and shows while the producers and crew get the set and game board ready for the next game. During this time, the helpful staff also assists contestants with any problems such as difficulty with the buzzers, makeup, and dry mouth.

Otherwise, the action stops only for commercial breaks, technical delays, and the period immediately before Final Jeopardy when contestants are allowed more time to make their bets. This period was the most stressful of the entire game, because I was trying to figure out an intelligent bet for myself while wondering what the other contestants were wagering.

The buzzer also made me a little nervous; if you ring in an instant too early, before Alex Trebek finishes reading the question aloud, your buzzer is locked out for half a second—long enough for another contestant to ring in. This system is designed so that the home viewers and contestants can hear the question before someone rings in and answers. I sometimes had a problem with this because I read too rapidly and would instinctively press the buzzer when I knew the answer, even though Mr. Trebek hadn't yet finished. It takes several questions to get the timing right, and it's easy to slip back into buzzing in too early.

I tried to develop different strategies. Should I answer easy questions first and accumulate as much money as I could at the beginning, or should I save categories that I knew for the end for a stronger finish? I couldn't decide while I was playing because of the fast pace, and even now I don't know which way is best.

One strategy did help me get to the finals. Because the Teen Tournament is set up to allow four Wild Card (high-scoring) contestants into the semifinal round, I didn't worry as much about winning my first game as I did about accumulating enough money to qualify for a Wild Card position. So I made it my goal to have at least $10,000 after the first game, which I thought would be enough to advance me to the next round.

At the end of my quarterfinal game, only $200 separated me from the boy in second place. I bet conservatively in the Final Jeopardy round, risking only $2,400 of my $12,400. I figured that, even if I didn't get the Final Jeopardy question right, I would still have $10,000 and (I hoped) a Wild Card slot.

Although my competitor doubled his winnings on that question, I did earn $14,800 and a place in the semifinals.

Of course, strategy would not have done me any good if I hadn't known the answers. Because I always watch *Jeopardy!*, I was familiar with frequently used categories such as Books and Authors, Mythology, and Geography. But I was pleasantly surprised when I did well in some of the more unusual categories: I *ran* (answered 5 out of 5 correctly) Marsupials—a category I'd never seen before—and came close to running Italian Scientists. I knew the correct question was "What is Avogadro's Number?" but hesitated because I couldn't decide if it was Avogadro or Agovadro. I don't know if the other contestants had the same problem, but nobody came up with the answer.

Along with strategies and knowledge, other factors influencing the outcome of *Jeopardy!* games include stage fright (although the contestants can't see the audience, they know they're out there), eye-hand coordination (buzzers again!), and pure luck.

WORTH YOUR WHILE

If a contestant can really see this as a game and not as some type of evaluation of ability or intelligence, *Jeopardy!* can be a terrific once-in-a-lifetime experience. Each Teen Tournament contestant gets a trip to California (with a guardian) for the taping, as well as lots of other prizes donated by sponsors.

Quarterfinalists are guaranteed $1,000, and semifinalists $5,000. Third place is guaranteed $7,500, second place $15,000, and first place $25,000. However, these are only minimum guarantees; if you win more, you are allowed to keep it. This year, first place went to Matt Zielenski, who won $42,300; I was in second place with $26,200; and in third place, Deborah Sager won $17,300—the highest total winnings ever awarded in the history of the Teen Tournament.

If you think you'd like to try out for *Jeopardy!*, my advice is an unqualified "go for it!" The great experiences I had in California more than made up for the pressure of being on TV, and I would do it all over again, without any reservations. ■

Susannah Batko-Yovino *has previously written articles for us about the National Geography Bee and the Penn Summer Academy in Communication Studies. She will spend five weeks this summer interning at the National Geographic Society in Washington, D.C.*

Sometimes, an everyday act in a country halfway around the world has quintessentially American elements. . . .

Apprehensive *by Huat-Chye Lim*

Is it worth the wait
I ask myself
As I sit at the round wooden table with the red and white
checkered tablecloth
That seats four
I ask myself
As waiters in casual dress bustle around me
And other people sit crammed in at booths or at similar tables
Like the one I'm sitting at
Sitting and talking
Over the din of waiters yelling and others talking and loud
singing and the live band
Whose music blares out through the huge woofers mounted high on
the walls
That are filled with rock 'n' roll memorabilia and autographed
pictures and even
An autographed keyboard;
And as I wait I smell
The scent of freshly cooked beef filet and crisp, fresh salad
topped with Thousand Island dressing
And steaming cheeseburgers that are taller than
anything I've seen
With large sesame seed buns
And huge beef patties and cheddar cheese that's practically
dripping off the sides
Loaded with oil and grease
And crunchy American apple pie with vanilla ice cream and a
sundae with a large red cherry on top
And the ever present smell of cigarette smoke lingering beneath
the lustery white ceiling
With those little overhanging Tiffany imitation lamps.
And all the time
Over the roar of loud singing and the band playing away and
the waiters taking orders and new customers walking in through
the main glass doors
That lead out to the marble steps with the iron railings and the
small red canopy that juts out of the sides
Of the Hard Rock Cafe in Kuala Lumpur,
All the time I am asking myself
Is it worth the wait?
And then, as if to answer the question,
My cheeseburger done medium rare arrives and the waiter lays
it down, gently, on the circular wooden table with the red
and white checkered tablecloth (which seats four)
And I remove the toothpick and the sesame seed bun
And add the fresh lettuce and the big red tomato on top of
the cheddar cheese melted over the beef patty
And salt it heavily
And then pat it down and bite into it
So that the grease oozes out and I taste the meat that's
overloaded with salt and the tangy cheddar cheese and the
crunchy lettuce and the juicy tomato
And then I tell myself
Yes!

Twelve-year-old ***Huat-Chye Lim*** attends 8th grade at the American School of Brasilia, Brazil. He enjoys attending CTY's summer programs, computer programming, competing in Knowledge Bowl, reading, swimming, and playing badminton.

FASCINATING CLASSICS

My Name is Asher Lev

by Chaim Potok

Review by
Charles Beckman & Lesley Mackay

Charles: In the universe known to modern astronomy, each body in the solar system maintains its place, not by chance, but in relation to all the other bodies that exert force upon it. An asteroid may seem to occupy its position randomly, but in reality other objects—notably, nearby large stars or planets—exert gravitational pulls that hold its position.

In the cosmology of Chaim Potok's 1972 novel, *My Name is Asher Lev*, the main character is an asteroid with a trajectory all his own, who is also under the conflicting influence of two great planets: a domineering father and a dogmatic mentor. And like the physical universe—in which most of the mass is invisible, detectable only by its gravitational influence on visible matter—Asher Lev's universe is also shaped by the powerful forces of Orthodox Judaism and its view of God.

Lesley: From the point of view of early adulthood, Asher narrates this story of his boyhood and adolescent struggles to grow up and to develop his own sense of vocation. But on a deeper level, the book elaborates a theme that we certainly did not see in *The Great Gatsby*, and that has not been as explicit in any of the other novels we have read this year—that of religious commitment and its implications for the individual.

Charles: Asher is a member of a small sect of Hasidic Jews, a closely knit group identifiable by Orthodox customs regarding clothing, hats, and hair. Within this culture in which individuality is submerged in community values and traditions, Asher struggles to pursue an intensely personal calling, art.

Lesley: Although Asher contends with desire and ambitions his culture cannot accept, he never rejects his religion, and he observes the customs of his faith throughout the novel.

It is some of the social mores that bind his people that Asher finds limiting—particularly, the rejection of artistic expression. Still, he is attached to many aspects of his community. He loves both his parents, as well as several other regulars in his daily life. And he is deeply drawn to his Brooklyn street, a location that suffuses the art he eventually creates and nurtures his basic sense of identity.

Potok shows that Asher both desires and rejects fitting in. To me, his mixed feelings are much more moving than simple rebelliousness is.

Charles: I agree. Although the son has rebellious moments, it's actually the father who, although a pillar of their community, is personally out of control.

Asher's father is an intense, humorless man. He believes painting to be frivolous and has only one wish for Asher, that he follow the family tradition of religious scholarship and social commitment. Part of the novel is set in the 1950s, a time of great state-supported persecution of Jews in the Soviet Union, and Asher's father voyages tirelessly to rescue its victims. This endeavor, and his close ties to the Rebbe, the sect's leader, assure Aryeh Lev's prominence in the community.

Lesley: Asher's father is truly disturbed by his son's need to draw and paint. He wants Asher to concentrate on his Talmudic studies, as a boy of his background is encouraged to do. But ironically, Asher's artistic drives emerge partly in response to the tension and distress of his household. I think Asher turns to drawing to express the confusion and anguish he feels as a powerless member of a family immersed, however nobly, in death and disaster. Making matters worse is the fact that neither parent seems attentive enough to making sure that Asher feels loved and secure.

Charles: Certainly, no one can fault the honor and altruism shown in Aryeh Lev's work. Yet, he has great trouble relating to his son. Potok draws the father as a person who advances lofty principles, but can't put those values into practice in his personal relationships.

I was struck by how minor an influence Asher's mother seems. Asher spends lots of time talking with his mother, but she seems too distracted to offer much to his formative life. She is most visible in her role as peacemaker, trying to steer the family away from a father-son explosion.

Lesley: Really? I believe that Asher's mother is a central—in a way, *the* central—character in the book. Although she is quiet and deferential, at times verging on utter martyrdom and despair, it is she who embodies the conflicts that structure the novel.

In her intimate understanding of her husband and son, Rivkeh Lev bears the full and tragic weight of their differences. When the novel reaches its exciting climax at the formal exhibition of Asher's paintings, it makes sense that it is a rendering of his mother that is at the heart of his work, and that he has brought so much empathy and intensity to his vision of her suffering.

Charles: But think of how understated the mother's role is when compared, say, with the influential part played by Jacob Kahn, a mentor the Rebbe finds for Asher after it's apparent that his relationship with his father has broken down. Kahn has his roots in the Orthodox community, is friends with the Rebbe, and respects Asher's father. But by the time we meet him, he is a deeply secular artist.

Jacob Kahn is irrepressible in his sense of humor and wry outlook on life. He's a dominating presence whose strong opinions about life and art find Asher's ready ear in a way his mother's weak directives do not.

Jacob Kahn's message to his protégé is that emotions are essential aspects of human experience and that visible, tangible objects merely represent emotions. He convinces Asher, sometimes through browbeating, that injecting intense feeling into his paintings should be an artist's chief goal.

Lesley: It is true that Kahn is relentless in urging Asher to explore, and even provoke, deep and painful emotions within himself. As you point out, Kahn's behavior mirrors that of Asher's first mentor, his father. Both men believe one should never give up, and both endorse going to extremes regardless of cost: Asher's father risks his life and his family's well-being in order to fulfill his sense of mission in the world; Kahn accepts a debilitating depression in order to continue pushing himself as an artist.

Kahn's orthodox view of the artistic community is as exclusive and rule bound as is the perspective endorsed by Asher's religious sect. The art world according to Kahn is haunted by the Great Masters, just as Orthodox Judaism harkens back to the ancient Law. One must suffer greatly, in his view, in order to wear the mantle of the artist.

Charles: And look at the differences expressed in the two ways of life: secular and religious. The secular artist's view is expressed by Jacob

Kahn, who deifies not God and community, but Picasso and the expression of the individual through art.

By contrast, Asher's father and the rest of his community view God as an omnipresence who reviews everyday actions, actively rewarding good deeds and punishing bad ones. So pervasive is their awareness of God that commonplace acts become ritualized: meals are accompanied by the singing of religious songs; each morning Asher partakes of an orange juice, water, and sugar concoction that his father believes carries near-divine curative powers.

God watches over the family, the father believes, and is ready with punishment when Asher chooses to pursue his talent and his journey toward self-knowledge, rather than community service.

Lesley: Well, I am not sure that the family is exactly punished. I think instead that they are forced to question their tightly controlled worldview. At the beginning of the novel, Asher's parents, especially his father, hold a black and white moral vision in which something is either godly or of "the other side." When their only child starts to communicate through highly expressive art, they are no longer able to maintain such a polarized perspective. Asher's intense sincerity and almost painful commitment to his painting and drawing serve to deepen that tension: it becomes difficult for them to write his talents and discipline off as ungodly.

Charles: Although they may no longer see his art as the product of "the other side," it clearly comes out of a strong upwelling of feeling—the very thing his father has instructed him to repress.

But as Asher learns from Abstract Expressionist Jacob Kahn, an artist cannot hold back from expressing his version of the truth, however raw and hurtful. It isn't enough to paint what he sees; he must also paint what he feels.

This is what gets Asher into big trouble. Growing up in a world where negative emotions are repressed, Asher accumulates a great stash of hybridized guilt and anguish. And one day he releases all of it into two paintings of his family.

This action—and the ensuing scenes when Asher realizes that his parents will see the paintings in a crowded gallery during the opening of his exhibition—filled me with dread. Potok pulls out all the stops at the chilling moment when Asher's parents stand in front of those paintings, and we learn that our dread was well founded.

Lesley: Ironically, Asher's controversial works are founded in a deep sensitivity to his family and community. He reproduces the anguish created by the different perspectives at work in his family. His painting is an act of fidelity—not to an Orthodox faith, but to the complexity of his mother, a woman who loves a husband and a son who have irreconcilable visions.

Asher uses Christian motifs in the portrait of his mother because he sees none in the Jewish tradition that will allow him to do justice to her suffering. Yet, because he employs the symbol of the crucifixion, his family and his community interpret his paintings as a slap in the face.

Charles: In fact, in the opening pages of the novel, Asher expresses his own incredulity at using a Christian symbol in his work. But he also makes the point that employing the cross is not a religious act, but an artistic one: by using the symbol of the crucifixion, he stands in legion with his peers in the painting tradition, the same way a poet writing an elegy aligns with all of his or her predecessors.

In any age, appreciation of the purely formal elements of emotionally loaded subjects such as religious icons proves difficult. But I was struck by how dramatically American society's response to art has changed in the years since this book was written. In the late 1960s, Asher's family and community decry his product, while he wins acclaim in the larger world. If the novel were set in contemporary times, however, their outraged voices might be joined by those of members of Congress and radio talk show hosts. The time frame of the novel does seem to accept experimentalism in a way that we today do not.

Lesley: I agree. Potok's world also seems like a more nurturing and dignified place for the individual. We have talked about the restraints imposed on Asher by his religion, but I think we both also appreciate that his faith, family, and community are greatly enriched by a sense of the sacredness of life.

Charles: Overall in Potok's novel, I found a clearer, less sentimental, more powerful statement of what James Joyce tried to do in *A Portrait of the Artist as a Young Man*. In both novels, the authors run the risk of seeming to merge their protagonists' lives with their own, which can lead to their sounding self-indulgent. But Potok's world of the visual artist is so credibly conceived, we are able to get past the idea that somehow he's talking about his own development as a writer.

Lesley: For me, human development is the key notion in this book, and you don't have to be an artist to appreciate Potok's many insights on the topic. The book asks, what is ideal human development, and what does it take for people to develop?

According to Potok, people need the right kinds of inspiration. Asher's last paintings blend insights gained from Michaelangelo's classical biblical renderings—which themselves represented new ways of looking at the world—as well as his own store of highly personal images. On the blank canvas, he melds these influences to express himself in a voice all his own. Does this amount to a sin? I think Potok implies that this act of creation is necessary, not only for Asher's art, but for the growth of his soul. ■

For next year's theme, Innocence & Experience, we will review Lord Jim *by Joseph Conrad,* Middlemarch *by George Eliot,* The Mayor of Casterbridge *by Thomas Hardy,* Frankenstein *by Mary Shelley, and* Catcher in the Rye *by J. D. Salinger.*

***Lesley Mackay**, who holds a B.A. from the College of William and Mary and an M.A. in English from Indiana University, is CTY's Staff Writer.*
***Charles Beckman** holds a B.A. from Penn State and an M.A. from the Writing Seminars at The Johns Hopkins University. He is an Assistant Director of Academic Programs at CTY.*

R NG

by Lesley Mackay

In the January/February 1994 issue of *Imagine*, we published an article on *changes in format* to the SAT I/Scholastic Assessment Test. This set of changes—now in place—grants more time per question, permits the use of calculators, adds to the reading comprehension section, and includes non-multiple-choice math problems which require students to give their own answers. These new features were designed to further refine the assessment of reasoning skills in both the verbal and math segments of the test.

This spring, changes were made in the SAT I *scoring scale*. Previously, scores were normed in relation to a set of results obtained from test-takers in 1941. Beginning with the April 1995 administration, however, SAT I scores are being reported according to test outcomes in 1990. (The new centering also affects scores on the PSAT/NMSQT and SAT II: Subject Tests.)

HOW
HAVE SAT SCORES CHANGED?

In 1941, a score of 500 on either part of the test represented the *mean* or average of all scores on the 200- to 800-point scale. Over the next fifty years, however, the mean verbal score dropped to 424, while the mean mathematics score dropped to 478, creating a difference of 54 points in the average performance on the two test sections.

The College Board has explained that means above or below 500 make it more difficult to interpret distinctions between different test performances. Also, many people may not have realized that the mean math score was significantly higher than the mean verbal score.

Now, with the mean at 500 for both tests, it will be clear where an individual student's scores fall in relation to the average. The 76-point shift in the score used to report the mean of the verbal test and the 22-point shift in the score used to report the mean of the math test will result in higher reported scores for most students.

WHY
HAVE SAT SCORES CHANGED?

The scale on which past scores were based was generated from the results of *ten thousand* students who took the SAT in 1941. As stated above, the average performance of those students established the original 500-point means.

By 1990, however, over one *million* students were taking the SAT each year. The exponential increase in the college applicant pool helps explain why a different spectrum of precollegiate academic preparedness has emerged and is reflected in current SAT scores.

But where do these facts lead us? It's true that recentering should make it easier for students to relate their scores in the two subject areas and may allow finer distinctions among test performances. If the validity of the SAT as a measurement of academic skills is improved by recentering, this change is a positive one. At the same time, however, the recentering does raise important questions about how and why we assess academic skills and understandings.

WHAT
DO SAT SCORES TELL US?

Differences of opinion about the recentering seem to reflect different ideas about the purpose of the SAT and the significance of SAT scores.

Critics of the recentering's upward shift in reported scores express concerns that academic standards based upon the previous scale are being diluted. One baseline for assessing results is being replaced with another, and the recentering does produce an apparent rise in results that is not based on actual performance (i.e., the same level of performance generates higher scores). For those who regard the SAT as a unique, cross-generational indicator of students' academic skills, there is greater value in the scoring scale remaining fixed. In advising the public about the recentering, however, the College Board pointed out that the primary importance of SAT scores is to indicate a student's academic readiness for college and to evaluate her/his skills in comparison with those of other applicants. Individual SAT scores help students determine where their own admissions prospects are strong, and help colleges and universities make appropriate admissions decisions.

CONCLUSION

If we regard the SAT primarily as a tool for assessing students' college preparedness, modifying the scale on which scores are based is of little importance. If recentering enhances the validity of scores, and if those who interpret scores understand the difference between the two scales, such renorming does not raise serious questions.

College Board literature reminds us that the recentering will not affect either the level of difficulty of the tests or the percentile rankings that express one test-taker's rank in relation to all others'.

Furthermore, equivalency tables provided by the College Board will enable students, parents, and educators to compare recentered scores with earlier results. Guidance counselors have received tables and other information for comparing scores on tests taken before and after April 1995. ■

For information about SAT I or SAT II:
Brad Quin, College Board, 45 Columbus Avenue, New York, NY 10023-6992; (212) 713-8000

For more information about recentering the SAT:
Jan Gano (212) 713-8175 or Fred Moreno (212) 713-8185

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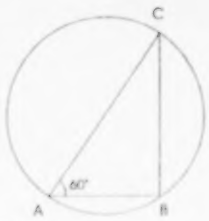
3. First, $|BC| = 2R \cdot \sin A$ (why?)

$= 2 \cdot 4 \cdot \frac{\sqrt{3}}{2} = 4\sqrt{3}$

$|BC|^2 = 48$



By the Cosine Law,

$|BC|^2 = |AC|^2 + |AB|^2 - 2|AC||AB|\cos A$

$= |AC|^2 + |AB|^2 - |AC||AB|$

$= (|AC| - |AB|)^2 + |AC||AB|$

$\Rightarrow |AC||AB| = |BC|^2 - (|AC| - |AB|)^2 = 48 - 16 = 32$

Area of $\Delta ABC = \frac{1}{2} \cdot \sin A \cdot |AC||AB| = 8\sqrt{3}$

1. Let x be the common root, and $a \neq b$.

(1) $\Leftrightarrow (x-1)a^2 - (x^2+2)a + (x^2+2x) = 0$

(2) $\Leftrightarrow (x-1)b^2 - (x^2+2)b + (x^2+2x) = 0$

$\Rightarrow a$ and b are the two roots of

$(x-1)t^2 - (x^2+2)t + (x^2+2x) = 0$

$\Rightarrow a+b = \frac{x^2+2}{x-1}$, and $ab = \frac{x^2+2x}{x-1}$

$\Rightarrow ab - (a+b) = 2$

$a(b-1) = b+2$

$a = \frac{b+2}{b-1} = 1 + \frac{3}{b-1}$

$\Rightarrow b = 2, a = 4$ or $b = 4, a = 2$

In either case, $\frac{a^b + b^a}{a^{-b} + b^{-a}} = \frac{4^2 + 2^4}{4^{-2} + 2^{-4}} = 256$

4. Since $p \neq q$,

[if $p = q$, then $\frac{2p-1}{p} = 2 - \frac{1}{p}$ is not an integer]

we may, without loss of generality, assume $p > q$.

Let $\frac{2q-1}{p} = m$, where m is a positive integer.

$\Rightarrow mp = 2q - 1 < 2p - 1 \Rightarrow m = 1$ and $p = 2q - 1$

$\frac{2p-1}{q} = \frac{4q-3}{q} = 4 - \frac{3}{q}$

$\Rightarrow q = 3, p = 2q - 1 = 5$

and $p + q = 8$

2. $\angle 2 = \angle 3 \Rightarrow DE // AC \Rightarrow \Delta EBD \sim \Delta ABC$

$\angle 1 = \angle 2, \Rightarrow \Delta ABC \sim \Delta DAC$

$\therefore \Delta EBD \sim \Delta ABC \sim \Delta DAC$

$\Rightarrow \frac{m_1}{m} = \frac{BD}{BC}$, and $\frac{m_2}{m} = \frac{DC}{AC} = \frac{AC}{BC}$

$\Rightarrow \left(\frac{m_2}{m}\right)^2 = \frac{DC}{AC} \cdot \frac{AC}{BC} = \frac{DC}{BC} = \frac{BC - BD}{BC}$

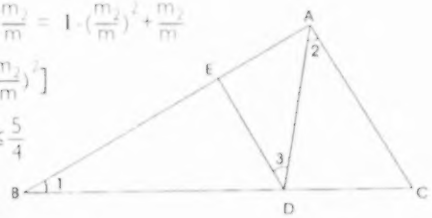
$= 1 - \frac{BD}{BC} = 1 - \frac{m_1}{m}$

$\Rightarrow \frac{m_1}{m} = 1 - \left(\frac{m_2}{m}\right)^2$

$\frac{m_1 + m_2}{m} = \frac{m_1}{m} + \frac{m_2}{m} = 1 - \left(\frac{m_2}{m}\right)^2 + \frac{m_2}{m}$

$= \frac{5}{4} - \left[\frac{1}{4} - \frac{m_2}{m} + \left(\frac{m_2}{m}\right)^2\right]$

$= \frac{5}{4} - \left(\frac{1}{2} - \frac{m_2}{m}\right)^2 \leq \frac{5}{4}$



5. $\Delta PAB \sim \Delta Q'CB \sim \Delta QCD \sim \Delta RED \sim \Delta REF \sim \Delta P'AF$

Let S_1, S_2, S_3, S_4, S_5, and S_6 be the areas of the six triangles respectively.

$S_1 + S_3 + S_5 = S_2 + S_4 + S_6$

$\frac{b^2}{a^2} = \frac{S_2}{S_1}, \frac{d^2}{a^2} = \frac{S_4}{S_1}, \frac{f^2}{a^2} = \frac{S_6}{S_1}$

$\therefore \frac{b^2 + d^2 + f^2}{a^2} = \frac{S_2 + S_4 + S_6}{S_1}$

$\Rightarrow \frac{a^2}{b^2 + d^2 + f^2} = \frac{S_1}{S_2 + S_4 + S_6}$

Similarly, $\frac{c^2}{b^2 + d^2 + f^2} = \frac{S_3}{S_2 + S_4 + S_6}$, and $\frac{e^2}{b^2 + d^2 + f^2} = \frac{S_5}{S_2 + S_4 + S_6}$

$\Rightarrow \frac{a^2 + c^2 + e^2}{b^2 + d^2 + f^2} = \frac{S_1 + S_3 + S_5}{S_2 + S_4 + S_6} = 1$

$\therefore a^2 + c^2 + e^2 = b^2 + d^2 + f^2$.

Mr. Feng teaches mathematics at the Oklahoma School of Science and Mathematics (OSSM) and has coached many students who have competed successfully in mathematics contests in China and the U.S. In this column, Mr. Feng offers *Imagine* readers questions designed to improve their problem-solving skills.

STUDENTS REVIEW MIT

College Review Series

This on-going series is intended to aid prospective college students in their search by offering insiders' views of selected colleges and universities, as expressed by current undergraduates or recent graduates who have exceptionally high academic ability. Our reviewers all share high expectations for a college's academic standards and its nurturance of emerging talent.

Note that the number of student reviewers is small. Consider their personal perspectives as only one component while you gather factual information and impressions from such other sources as college catalogues, site visits, talks with officials and students on campus, and the advice of your guidance counselor and teachers.

Massachusetts Institute of Technology

Our reviewers include sixteen students, who major(ed) in architecture (1), biology (1), computer science (4), economics (1), electrical engineering (2), math (5), and physics (4). We also include comments from an MIT graduate student. Students' comments appear within quotation marks.

Quality of Academic Instruction for Undergraduates

Reviewers were unanimous in praising the quality of the technical education MIT offers. They were also unanimous in stating that the workload is intense. To provide mid-year relief, Independent Activities Period (IAP) is scheduled during January, "a month off from regular classes for students to explore other areas and take fun classes."

"The academic resources in science and engineering are the best in the world. Most professors will go out of their way to help you if you ask for it, but it's your responsibility to seek them out (which can be intimidating, like most things at MIT). This is also true of most students—people are very helpful because ***no one*** *can get through this place by him/herself."*

"Excellent. The intelligence and teaching ability of the professors I've had is phenomenal. The professors are also approachable and available, although access to professors can be kind of limited unless you get involved in an undergraduate research project. It's true that many classes, especially for freshmen and sophomores, are large lectures; but I did not find this to be a problem at all. There are small group sessions to accompany the larger lectures."

"MIT's core—one term of biology, one chemistry, two physics, two calculus, one lab class, two tech classes outside your major, and eight humanities courses—provides a strong base for someone who is science oriented. The science classes are challenging (and sometimes seem impossible), but you always come out feeling that you've gained a great deal of knowledge."

"MIT has an exceptional, institute-wide Undergraduate Research Opportunity Program (UROP) that provides undergrads with easy, direct access to experience in research groups on the cutting edge in their fields. More importantly, UROP has created the attitude among faculty and grad students that undergrads should take part in research. I don't think any other school in the nation involves its undergrads in research to the extent that MIT does."

"MIT is where things ***happen;*** *even we lowly undergraduates sense this. Research is very much in the open, and students are encouraged to join in. On the other hand, most professors are researchers more than teachers. From looking at our course evaluation guide, you would get the impression that our best-taught subjects are music and Japanese!"*

"The infamous Junior Lab for Physics Majors is a full-year intensive lab experience in which you recreate famous (Nobel Prize-winning in their day) experiments and observe the results that led to the confirmation of many formulas and theories. The course was actually a lot of fun and probably one of the most valuable physics courses I've taken."

"Almost every class is graded on a curve, most class grades are centered on B/C or B. Grading procedures are usually fair (although I heard of one test on which 20% was an A). Freshman year is Pass/No-Credit, which is positively wonderful and saves you from going insane."

Social Life

In a nutshell, "Everyone here is smart and weird, just like you. It's great." Another reviewer was quick to point out, however, that "MIT really isn't exclusively for computer nerds."

"It's great. Interacting with fellow MIT students is exciting and rewarding. And I love living in a dorm that faces the Charles River and the gorgeous Boston skyline. It's fantastic and beautiful. We study a lot, but most of us do enjoy socializing. The location is great, and students are generally friendly—if you shut yourself up in your room for four years, it's your own fault."

"Boston is the best college town in the country. MIT does not go out of its way to sponsor social events, but with downtown Boston five minutes away, it really doesn't have to. On campus, the social activity is split about evenly between dorm activities and frat parties."

"Social life at MIT centers on the living groups. Approximately 50% of the students live in about 40 fraternities and Independent Living Groups (ILGs) on campus. All students, including freshmen, decide where they want to live, so all living groups and dorms have a distinct personality. (MIT has rush the first week of freshman year: you live out of a suitcase, meet people, and decide where you want to live for the next four years. Even dorms have rush.) Social life can vary greatly depending on where you live."

"The stress level at MIT depends on one's major(s). I'm a math major and am not overly stressed. Engineers and science majors who take lab courses are more stressed. I have a good time—I sleep, eat, study, see movies, and read for fun. I even go to Boston once in a while."

What Do You Like Best about MIT?

"I am convinced that I am getting the best education available. This tends to make all of the hell worth it. The people are wonderful

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and all very intelligent. Once I survive MIT, I know I can survive anything—this is a nice feeling."

"Having a big, friendly city right across the river is great (Symphony Hall is within walking distance), but what I like best about MIT is its academic excellence. The caliber of the students and professors at MIT is second to none. When I say, 'I attend MIT,' I say it with an enormous amount of pride—because I know how much hard work and dedication it takes to be a student here."

"I like knowing that I'm learning cutting-edge information and the most current technology, and interacting with brilliant minds (both the caring faculty and helpful fellow students). I also appreciate the quiet and dignified atmosphere of the campus."

"The people I met at MIT who are now life-long friends. And the academic challenge; I found that I was well-prepared for both the work place and graduate study afterwards."

"IAP! It's wonderful to have nothing to do but go to lectures that interest you. I really enjoyed hearing Freud's life story, looking at clouds on Jupiter, and watching 'Casablanca'. Doing what you want all day for a month, when there's so much to choose from, is simply awesome!"

What Do You Like Least about MIT?

Most comments were variations on the theme, "The workload!"

"This place is very stressful, constantly stressful, and some of it is probably unhealthy. MIT is a great ego deflator; at times it's very discouraging. I think that, had I gone anywhere else, I would still think of myself as brilliant."

"The fact that the demand for academic excellence leads to an atmosphere where everyone is stressed out and overworked. Of course, you can't have it both ways—being at one of the top schools has a price, and the price is hard work."

"MIT doesn't have a diversity of majors. I found it something of a loss not to be able to get to know and learn from people studying other, dramatically different majors."

Who Would Be Most Compatible with the Academic and Social Atmosphere at MIT?

All reviewers agreed that "it takes a certain kind of person to be happy here—MIT is certainly **not** for everyone."

"Someone who likes numbers—all our courses, buildings, and professors are numbered. Someone who likes science—that's what MIT is all about. And someone who likes hard classes—they're everywhere."

*"Someone with academic confidence, not arrogance; arrogance is shattered rather quickly at MIT. There are **lots** of people here who are **much** smarter than you, and you have to be able to deal with that. It's humbling, but you can't let it keep you down. And someone who can deal with both success and failure, many students who come to MIT have never experienced failure of any kind."*

MIT
Cambridge, MA 02139
(617) 253-4791

- 4-year private coed college.
- Urban campus.
- Full-time undergraduate enrollment 1994-95: 2,868 men; 1,604 women.
- Special features: UROP, many world-famous research groups (including those in Artificial Intelligence and the Media Lab), IAP LEGO Robot Design Competition, 5-year BS/MS co-op programs, cross-registration with Harvard and Wellesley, sailing on the Charles River.

"Someone who is very driven. On average, I think that MIT students work harder than any other undergrads in the country. One must not be easily discouraged. It helps to be outgoing, though many MIT students are not, but MIT is unlikely to bring anyone out of his/her shell."

*"Someone who is **sure** about going into engineering will love MIT. If you are on the line trying to decide, MIT will probably turn you off engineering."*

"Definitely disciplined and hard working, as well as intelligent. While many people do enjoy their four years here, I wouldn't come to MIT to have a 'fun time' in college—there are many long nights when it's not very fun. If you're looking for a challenge, looking to be pushed to excel in math/science/engineering, I would recommend MIT."

If You Had It to Do over Again, Would You Go to MIT?

All but one reviewer enthusiastically said yes; one reviewer expressed reservations.

"Yes, there's nowhere I'd rather be, although every time I get stressed out, I joke about transferring to Harvard. I often think this is an unhealthy place in terms of the level of stress. But I am convinced that I am getting a better education here than I would anywhere else, and ultimately that is the most important thing."

"Yes! MIT classes are taught at a terrific pace, which has been just right for me. I feel I am being pushed very hard, and in turn, I am learning much more than I would at most other schools. I enjoy the challenge. If the classes went much faster, they'd be impossible, but if they went much slower, I wouldn't be learning all that I could."

"Yes! One of these days I'll find my niche in my field of interest, and I think I need to be here to do that."

"I'm not sure. I'm at MIT for architecture, and some of the core is not very relevant to my career preparation. I might be happier someplace where I could take more electives in the arts. Prospective students should consider whether the extensive core is appropriate for their interests."

An MIT graduate student who had been an undergraduate at Harvard offered a somewhat different perspective:

"The very things that make MIT a terrific place to go to graduate school—tremendously gifted faculty and students devoted to world-class scientific research—are also reasons that make me hesitant to recommend the MIT undergraduate experience. Certainly, the academic scene in math/science is probably second to none, and the caliber of scientifically gifted students is also matched nowhere else (except possibly Caltech). However, I know that—for me—it was very valuable to spend my college years pursuing a broader range of interests (art, history and literature, to name a few) than those either provided or valued by the MIT community. There's plenty of time left after college to immerse yourself in the scientific world—say, during graduate school at MIT!"

As you try to find the college or university best suited to you, the views of MIT presented above may be helpful. Keep in mind that these students might have had similar positive or negative experiences had they attended a different university. At any college, it is important for the individual student to seek out challenging academic experiences and the best professors, and to create a social life that best fits his or her personal style. ■

Note: The students quoted in the College Review Series are expressing their own views, which are not necessarily those of IHE or CCV.

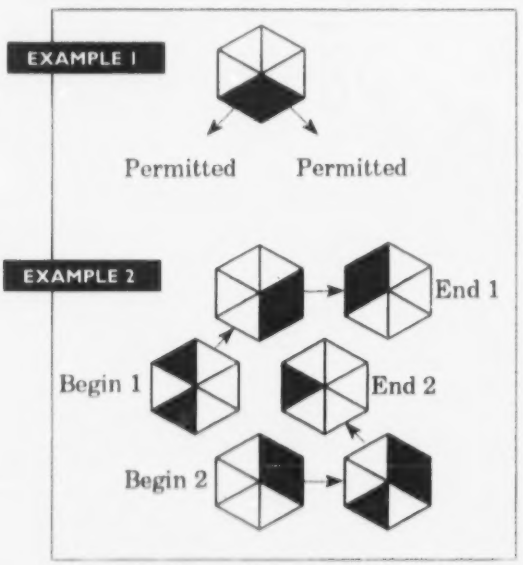
CREATIVE MINDS

ImaGiNe...

Submit your creative work—brain teasers, short stories/essays/book reviews. We look forward to hearing from you. Please write to *Imagine* • SET at CTY • The Johns Hopkins University • Baltimore, MD 21218.

This issue's student creative writing—a poem by Huat-Chye Lim titled "Apprehensive"—appears on p. 13.

Fascinated by mazes and puzzles, ***Tim Boester*** *is also intrigued by roller coaster design. Tim is a freshman at the University of Chicago, where he is studying physics and math.*



Solution to Puzzle in March/April '95 issue of *Imagine*, by Tim Boester:

Enter, L, N, T, X, B, V, Q, Exit

ANOTHER PUZZLE

by Tim Boester

Directions:

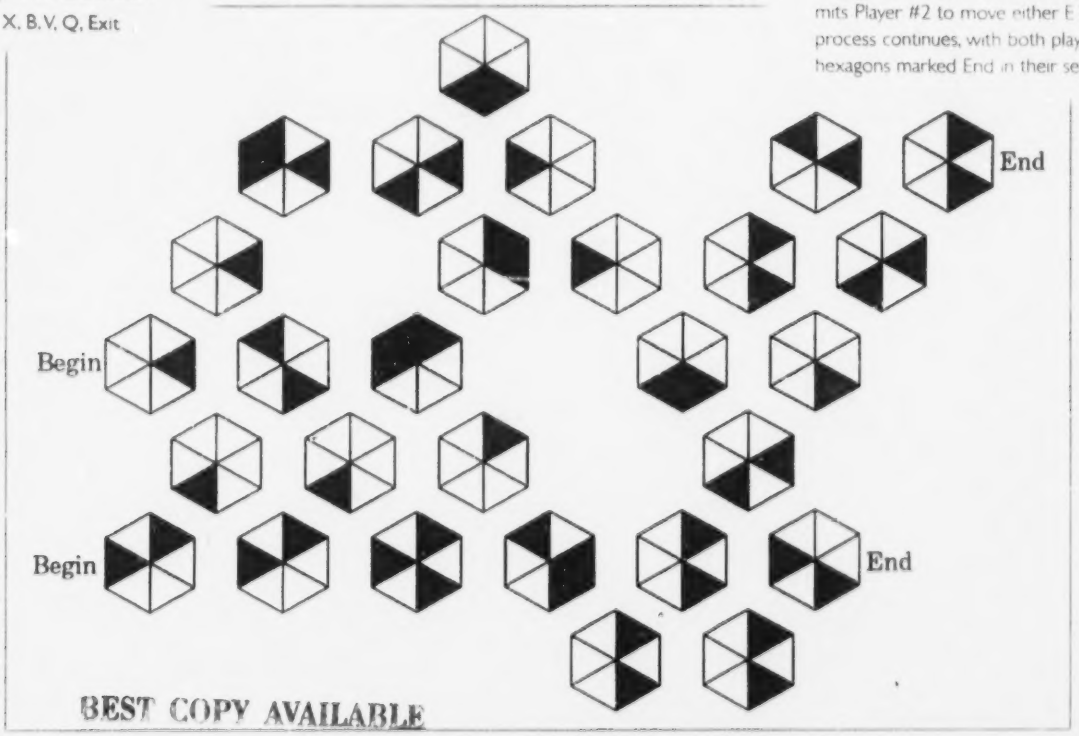
Warning—This is a complicated puzzle, so we're giving you the whole summer to work on it. The two examples help clarify the rules.

First, the easy part:

- This puzzle involves **two** players who take turns jumping one hexagon at a time.
- Each player begins at a different hexagon marked *Begin*.
- Players *are* permitted to move onto hexagons previously occupied by the other player.
- Each player must reach a different hexagon marked *End*.
- Since the two players alternate moves, they must arrive at the hexagons marked End in successive moves. If, for example, Player #1 arrives at one End hexagon on its seventh move, Player #2 must arrive at the other End hexagon in its next move.

Now, the hard part:

- The filled sector(s) on the hexagon occupied by *one player* indicate the direction(s) in which the *other player* is permitted to move.
- Example 1: If one player were on this hexagon, the filled sectors indicate that the other player would be permitted to move southeast or southwest, taking north as the top of the page.
- Example 2 provides a several-move illustration. Player #1 begins at the hexagon marked *Begin 1*. The filled sectors on Player #2's hexagon *(Begin 2)* indicate that Player #1 may move either NE or E. After Player #1 moves one hexagon NE, it stands on a hexagon that permits Player #2 to move either E or SE. This process continues, with both players landing on hexagons marked End in their second moves.



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